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THE merits of the government suit against the United States Steel Corporation involve such complex questions that certainly the judges of the Supreme Court are the only authorities competent to decide them. This refers only to the merits of the case as such. The act of the government in instituting the suit is another question. In discussing whether or not the Taft administration was "right" in bringing the suit, one must clearly distinguish between *legally* right and *economically* right. From the first standpoint, the government in its petition has made out a case which is at least a strong enough argument that the Steel Corporation may be a combination in restraint of trade, under the meaning of the Sherman law, to merit its review by a court. Also, and still from a legal viewpoint, President Taft is but doing his sworn duty in trying to enforce the law. Economically, however, the existence of the Sherman law, has, to say the least, never been justified. The government's petition does not even make a tryable case on the merits of whether or not the existence of the steel corporation is doing harm to the interests of the country as a whole, and if President Taft is to attempt to justify his action by trying to show that the suit is brought in the best interests of the country, we cannot see how he can succeed. It seems so obvious that even from a purely legal standpoint it would have been of greater advantage to have waited until the courts had finally passed on the reorganization plans of the Standard Oil Company and the American Tobacco Company before filing a petition seeking to break up the Steel Corporation, that one is driven to look for some ulterior motive for bringing the suit at this particular time. Surely, in passing on the reorganization of the Standard Oil Company and of the American Tobacco Company, the courts will give at some length their interpretation of what is meant by monopoly and by competition; interpretation which would be of value to the government in drawing up a petition against the Steel Corporation. It does not really terminate any business uncertainty to bring a suit at this time against the Steel Corporation; the suit will drag on for a couple of years at best. It does seem clear that the only interest that can particularly benefit by a suit brought now is the interest of the present administration and of the Republican party. By bringing the suit just at this time the administration lays itself open to the charge of playing politics.

IN a suit arising on the Southern Railway in Alabama, the United States Supreme Court, on Monday last, unanimously sustained the federal safety appliance laws as applying to all cars and vehicles used on an interstate line. The decision was by Judge Van Devanter. The road was prosecuted for using a defective coupler, and the defense was that the car was not being used in interstate traffic and therefore was not subject to the federal law. Judge Van Devanter holds that the safety appliance acts apply to all equipment on a highway of interstate commerce, without regard to whether the car, at the time of the occurrence on which the suit was based, was or was not carrying interstate commerce. This decision is the unanimous opinion of the court. In his decision Judge Van Devanter says:

> The several trains on the same railway are not independent in point of movement and safety, but are interdependent, for whatever brings delay or disaster to one, or results in disabling one of its operatives, is calculated to impede the progress and imperil the safety of other trains. And so the absence of appropriate safety appliances from any part of any train is a menace, not only to that train but to others. . . . The power of Congress to regulate interstate commerce is plenary and may be exerted to secure the safety of the persons and property transported therein and of those who are employed in such transportation, no matter what may be the source of the dangers which threaten it.

This attitude was plainly foreshadowed by Chief Justice Fuller's decision in the Johnson case in 1904, and in other decisions. A defective coupler or air brake, or even a loose door, or a single loose nut, on any car, may endanger lives on an interstate passenger train, especially on a double-track railway for the derailment of a freight may wreck a passenger train. Moreover, the principle that the lesser must yield to the greater justifies *general rules* regarding safety ap-

pliances; and infractions of a rule must be penalized even if a particular infraction be proved wholly harmless. Take, for example, the proposed federal block system law; the block signals would often, perhaps for a whole day, protect only trains doing intrastate business; but if the system is required for a part of the trains of a line there is good reason for requiring it to be maintained continuously, instead of intermittently, in order to insure its efficiency and to prevent lapses from good discipline. The decision seems to mean that the Federal government is the only authority that can regulate the physical equipment of a railway; it also implies that the Federal government is the only authority that can, in the interests of safety and social welfare, regulate relations between railways handling interstate business and employees. "Cars are seldom set apart for exclusive use in moving either class of traffic," said Judge Van Devanter, "but generally are used interchangeably in moving both, and the situation is much the same with trainmen, switchmen and like employees; for they usually, if not necessarily, have to do with both classes of traffic." The reference to employees is *obiter dicta*, but it shows plainly how the court's mind was working. It seems plain that under this decision every state law which conflicts with the Federal safety appliance law is invalid, if, indeed, every state law which regulates safety appliances at all is not by the decision rendered invalid. The court, reasoning along the same line, must necessarily hold that any state regulation of rates which conflicts with Federal regulation of them is an unconstitutional interference with interstate commerce. It does not, however, necessarily follow that the court will hold that state regulation which does not necessarily interfere with interstate commerce is unconstitutional, although certainly the decision looks that way. As Commissioner Lane indicated in an interview regarding this decision which he gave the press, states in some cases have so regulated rates as to raise what amounts to protective tariff walls at their boundaries. Now, this method of making rates may not directly interfere with interstate rates, and yet it may seriously, although indirectly, interfere with interstate commerce. Of course, the only way that this kind of indirect state interference with interstate commerce can be stopped is by entirely abolishing state regulation of interstate carriers. It looks very much as if this is the result which the decisions of the Federal courts ultimately are going to bring about.

THE PARCELS POST.

THE parcels post question will be before Congress this winter in a more acute form than heretofore. The senate committee on post offices and post roads, of which Senator Jonathan Bourne, Jr., of Oregon, is chairman, already has sent out blanks to the express companies and other interested concerns seeking information which will be amplified later at public hearings. The subject has never yet been fully discussed on its merits. The arguments advanced for parcels post legislation have been superficial and inconclusive. It is to be hoped that the investigations now being made and the later public hearings will bring out the facts and the arguments which really tell both for and against the project. If they do not the proposed legislation will be acted on unintelligently. The signs are that unless it is thoroughly discussed it will be passed in such form that it will lead to consequences no one now foresees.

There are several arguments for creating a parcels post. It would be a great convenience to the farmers of the country to be able to mail their orders to the large mail order houses and have packages weighing up to 11 lbs. delivered at their doors by rural free delivery. There are many outlying districts of cities and towns to which the express companies do not make delivery, and a parcels post would be almost an equal convenience to these people. The express companies by failing to extend their delivery service have helped to create the parcels post sentiment. Perhaps the returns from extension of it would not have equaled its cost, but this does not make any less true the statement that failure to do so has made advocates of a parcels post. Again, it is undoubtedly true that if the government should make a flat rate for the transportation of parcels, regardless of distance, those sending them long distances at least would get them carried at a lower cost than they do now by express. The service rendered by the government would very probably, as we shall see, cost it more than the recipient would pay for it. But this fact probably would not make so deep an impression on the person who received the service as it would on the minds of the taxpayers who had to meet the resulting deficit, if the facts could be brought forcibly home to them.

Several arguments are advanced for parcels post legislation which are either not pertinent or not valid. It is said, for example, that the government should render a parcels post service generally because under agreements with foreign countries it handles in the mails parcels which are imported or exported. If a general parcels post would not be a good thing it is no argument for it to say that there already has been made the mistake of handling parcels between this and foreign countries.

That parcels posts are conducted by foreign governments is another argument advanced for establishing one here. But the conditions here and abroad are so different that this alone proves nothing. In European countries density of population is great and area is small. Therefore, the average distances that goods of all kinds are shipped are much less than here. The average length of haul of freight on the railways of the United Kingdom is estimated at 25 miles. In France it is 80 miles, and in Germany 85 miles. On the other hand, in the United States the area is great and the density of population is small. In consequence the average haul of freight is 251 miles, and the average haul per parcel would doubtless be as much greater in proportion here than abroad as the average haul of freight is greater. It is proposed to fix a flat rate for carrying parcels for all distances. Now, obviously, the average cost of handling each parcel would be greater in the United States than abroad. The cost of collection and delivery at terminals might be the same, but, as the average distance that parcels would be hauled would be from three to ten times what it is in Europe, the expense of transportation would be much greater. Therefore, parcels may be carried in foreign countries for a flat rate that would cause heavy loss to the postal department of the United States.

It follows, then, that if the proposed parcels post is to earn its expenses of operation its rate would have to be much higher than is necessary in smaller and more populous countries. But if the rate should be fixed high it would discourage the sending of parcels for short distances, and if the government did not get the short haul traffic, the cost of handling which would be relatively small, its loss from the business in the aggregate might be, and probably would be, even greater than if it made the average rate low enough to get both short haul and long haul business. Conditions in the United States are such that it may be predicted with much assurance that if a parcels post with a flat rate for the carrying of parcels for all distances and for all weights up to 11 lbs. be established it will be operated at a heavy loss to the government no matter what the rate may be.

These losses will have to be made good by taxation. To levy taxes in order that certain classes of the community may get transportation of parcels for less than cost is equivalent to levying taxes and paying a cash subsidy to these classes equal to the difference between what the transportation rendered for them costs and what they pay for it.

Whom would the proposed subsidy benefit? The chief pecuniary backers of the movement for a parcels post are the large mail order houses. They must anticipate, and no doubt correctly, that they will be its main beneficiaries. They expect that the effect of the legislation will be to so reduce the cost of shipping their goods as to give them an advantage over the jobbers who sell to the retail merchants and over the retail merchants who sell to the consumer. The consumers of the

goods that the mail order houses sell will also be benefited by being enabled to get their goods somewhat more cheaply than they could get them from the retail merchants. The advantage of the legislation would be divided mainly between the mail order houses and their customers, and the taxpayers as a whole would be disadvantaged by having to make up the deficit from the operation of the service, and the jobbers and retail merchants by being undersold by the mail order houses.

One argument that has been used against a parcels post is that it would injure the country towns. The advocates of it have controverted this. But one of two things is true: Either the parcels post would not handle a large amount of business, in which case it would be a failure, or it would handle a large business, in which case it would divert business from the jobber and the country merchant to the mail order houses. The country store is the industrial heart of most country towns. Whatever tended seriously to injure its business would affect every other part of the community. For example, it would materially reduce the amount of advertising that the stores would give the country newspapers; and the prosperous country newspaper is an institution of very great importance to the intellectual and moral welfare of the rural communities and of the nation as a whole. The undermining of the country town would make its stores, its churches and its theaters less of a gathering place for the people of the surrounding country and, to a greater or less extent, destroy the community feeling. Whatever destroys community feeling will make the country town and the farm less attractive and cause further concentration of population in large cities. These developments would not be in the interest of the social welfare.

It has been suggested that a parcels post, by giving the rural free delivery service more business, would increase postal earnings on rural routes without increasing expenses. The rural carriers could handle much more matter than they do now without any addition to their numbers, their salaries or, perhaps, their facilities. This is a good argument for establishing parcels posts on rural delivery routes—that is, to carry parcels between the towns and the farms. It is not a valid argument for establishing a parcels post that would carry goods between all points in the country. A post which carried goods merely between the towns and the farms would not hurt the jobbers and the country towns and might earn more than it would cost. If, however, such a post were created it probably would increase rather than reduce the demand for the establishment of a general parcels post.

One point to which adequate consideration has not been given is that the establishment of a general parcels post would interfere with or increase the cost of the proper handling of the mails. The postal service was created for the transmission of written correspondence and printed matter. The speedy movement of such matter in a country so large as this is of such importance that, except on great consideration, nothing should be done that may interfere with it. The success that has been attained in the handling of the mails in the United States has been largely due to the use of post office cars for its distribution en route and to the receiving and delivery of light mail pouches at high speed. It is a common practice for trains to pick up and drop pouches while running 50 to 60 miles an hour. Mail bags filled with heavy packages can never be picked up or dropped at such speeds. Consequently, either the handling of the first and second class mail would have to be slowed up or these classes of mail would have to be sent not only in different cars but in different trains from parcels. If the first alternative were adopted the efficiency of the mail service would be reduced; if the second, the cost of the mail service would be increased.

It is an interesting and important question as to what effect the establishment of a parcels post would have on the express companies and railways. As already indicated, if a relatively high flat rate were established it would attract the long haul business from the express companies, but not the short haul business. But the express companies make their profit from the long haul business. It is doubtful, therefore, if they would or could long compete against a parcels post. If not, the parcel business would be speedily transferred from express to mail cars. The revenue *per ton mile* the railways get for hauling mail is greater than for hauling express; but their mail revenue *per car foot mile* is less, because under regulations of the Post Office Department they cannot load nearly as many tons of mail as of express per car. Consequently, if parcels were transferred to the mails, and mail loading per car and rates for handling the mails remained unchanged, the railways would get less revenue in proportion than they now get from handling express and mail. On the other hand, if the transfer of parcels to the mail cars led to a heavier mail loading per car the result might be an increase in railway revenues. In view of recent experience with the Post Office Department, however, it does not seem probable that if loading per car were increased mail rates would remain unchanged if the department had its way. As we have seen, it is most unlikely that any flat parcel rate could be fixed which would be remunerative. Confronted with a deficit from the parcels post business, the department would be apt to demand wholesale reductions in railway mail pay rates; and, if we may judge by the experience of the last four or five years, unless some new method of fixing mail rates were adopted the reductions demanded by the department would come and would be so drastic as to make the revenues of the roads from the transportation of mail—including parcels—less in proportion than they are now from mail and express. The department under the administration of Postmaster-Generals Cortelyou, Meyer and Hitchcock has been as unfair and arbitrary in dealing with the railway mail pay as the most accomplished and irresponsible of Russian bureaucrats could have been. They have tried to make records for efficiency, which is very commendable, but their efforts to make them at the minimum cost to those having the maximum political influence and at the maximum cost to those having the minimum political influence are not so commendable. It is very popular to attack the railways. Consequently, their mail compensation was the first point of attack in the department's efficiency campaign; and the investigation of the mail pay committee of the railways indicated that, however the case may have been before the reductions in mail pay in 1907, the mail compensation since they were made is smaller in proportion than the receipts from any other railway traffic whatever.

While railway men as citizens have the same right as other citizens to have and to voice their opinions on the parcels post question, as officers of the railways they have, of course, no right in their premises except to demand and use every proper means to obtain for the roads reasonable compensation for the services they render or may be required to render. It is quite probable that if the railways did oppose parcels post legislation they would simply increase the chances of its passage. On the other hand, it is hard to see how any reasonable man could object to their insisting that if any such legislation be passed it shall provide for the adjustment of railway mail pay on an equitable basis.

The government's attitude at present is inconsistent and unfair. It has established the Interstate Commerce Commission to arbitrate differences between shippers and travelers and railways regarding the reasonableness of freight and passenger rates; but it has made no similar provision for the investigation and determination of the reasonableness of the mail rates that the government itself pays. Congress fixes part of the rates by its fiat; the Postmaster-General fixes the rest according to his arbitrary will. The government is simply a big shipper that, under this arrangement, fixes its own rates; and, like other big shippers powerful enough to dictate to railways, it has been fixing them without proper regard to the rights and interests either of the railways or of others that they serve. Whether parcels post legislation is or is not passed—and especially if it is passed—there ought to be a thorough scientific investigation of

the entire subject of mail compensation by some impartial and expert body.

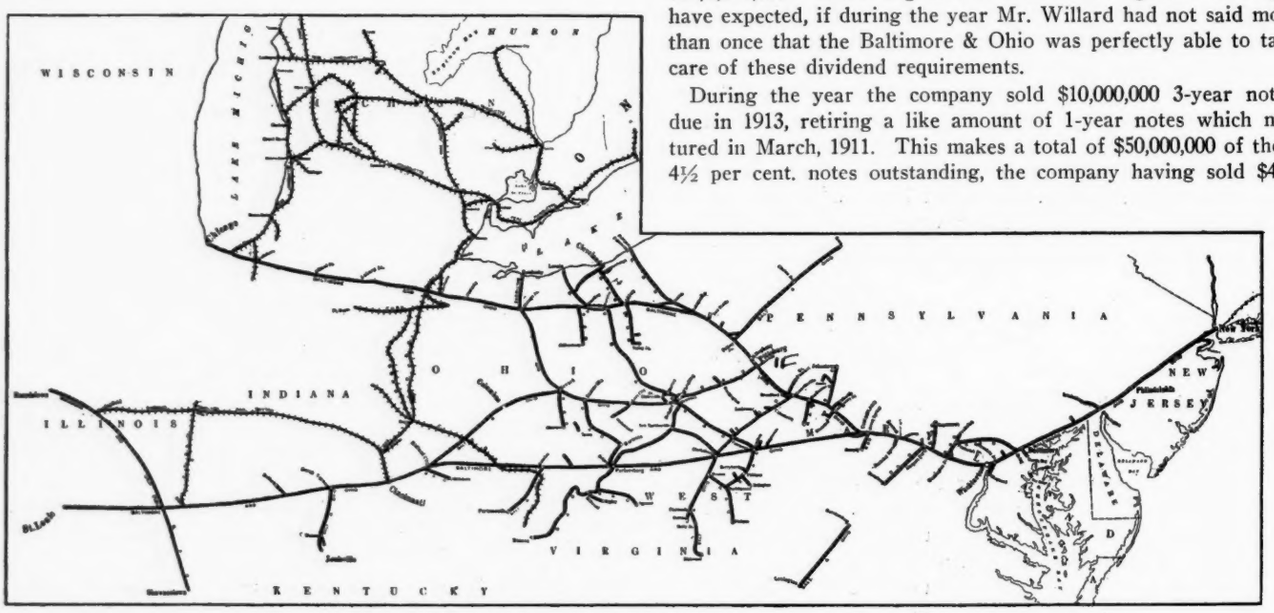
As already indicated, the mail pay committee of the railways found that the compensation of railways for handling the mails is, on the present basis, unremunerative. On the other hand, Postmaster-General Hitchcock has announced that the Post Office Department's analysis of the figures collected by it indicates that the mail rates can be further reduced and yet yield a profit to the roads. In such circumstances the need for a study of the question by a body able to command public confidence and competent to arrive at just conclusions seems manifest. The investigation might very properly relate not only to the question of what is reasonable compensation for the railways now, but also to what would be reasonable compensation for them for handling both mail and parcels, and to what effect on the total earnings and expenses of the Post Office Department the establishment of a parcels post would have if the mail pay of the railways were put and kept on a reasonable basis. To establish a parcels post without such investigation would be to take a plunge in the dark, the result of which to the railways, to the taxpayers and to all who are concerned would be entirely a matter of conjecture; and there is too much government by conjecture in the United States already.

BALTIMORE & OHIO.

IT takes unusual courage, and a firm belief in a railway property's earning power, to go ahead with extensive and very expensive improvements at a time when operating costs are rapidly increasing and the prospects of a prosperous business expansion are bad. Nearly three years ago, when Mr. Willard came to the Baltimore & Ohio, it was decided that the property needed a great number of additional facilities, and the subsequent story of the Baltimore & Ohio has been one of improvement and betterment regardless of business uncertainties that might well have made a less sure management hesitate. In the year ended June 30, 1910, the programme was only begun. In that year $5,550,000 was spent for "new construction"; all of this new construction being improvement to the existing property, the addition of second track, etc. In 1911 the Baltimore & Ohio spent $14,093,000 additions and betterments, and spent $15,439,000 for new equipment, retiring equipment with a book value of $871,000. Details of the new construction work are given in our Construction News columns. Certain developments, however, are of especial interest. For instance, 139 miles of new sidings were built in 1911, as compared with 47 miles built in 1910 and 47 miles built in 1909. Automatic block signals have been put in on 105 additional miles of main double track. The company is at work on a 4,000-ft. double track tunnel through the Allegheny mountains between Sand Patch and Manila, and it is estimated that this work will be done by about January, 1913. Of all of the extensive improvements President Willard in his annual report says: "It is proper to state that as yet little benefit has been realized from the use of the additional capital, but with the completion of the additions and betterments the road will not only be in a position to care for a very largely increased business but will also be enabled to handle more effectively and economically the present volume of traffic." And in addition to not as yet benefiting by the improvements that are under way, the cost of conducting transportation is increased because of the betterment work going on under traffic.

In the fiscal year ended June 30, 1911, the tonnage of freight carried by the Baltimore & Ohio amounted to 60,548,000, a decrease of 3.58 per cent., and freight revenue decreased by 2.56 per cent., the main losses in tonnage being in coke, ores, lumber and iron products, due to less active general business. Notwithstanding this loss in freight revenue and a seriously large increase in the cost of conducting transportation, the company was able to earn a net operating income, after the payment of taxes, of $22,634,000. This compares with $24,498,000 earned in 1910. After the payment of interest, rentals and other fixed charges, the company had $12,820,000 available for dividends, and the 4 per cent. dividends on the preferred stock and 6 per cent. on the common stock called for $11,476,000, leaving a surplus of $1,344,000. This is a good deal better showing than one might have expected, if during the year Mr. Willard had not said more than once that the Baltimore & Ohio was perfectly able to take care of these dividend requirements.

During the year the company sold $10,000,000 3-year notes, due in 1913, retiring a like amount of 1-year notes which matured in March, 1911. This makes a total of $50,000,000 of these 4½ per cent. notes outstanding, the company having sold $40,000,000 the year before. There was a reduction of $4,217,000 in cash on hand, leaving at the end of 1911 $7,539,000 cash; and a reduction during the year of $20,879,000 in loans and bills receivable, leaving $18,751,000 loans and bills receivable at the end of 1911. These reductions in working assets were due, of course, to the expenditures for additions and betterments and new equipment paid for during the year. The $10,000,000 1-year notes which matured in March last, referred to above, were carried as a working liability, while the 3-year notes which were sold to provide for their retirement are carried as a capital liability; so that total working liabilities are less—by $10,335,000—at the end of 1911 than they were at the end of 1910 and amount to $9,774,000. It is proper to point out in discussing the company's financial position that it has free in its treasury $28,000,000 Baltimore & Ohio Chicago Terminal first mortgage bonds,



Baltimore & Ohio and Cincinnati, Hamilton & Dayton.

in addition to stocks and bonds of other companies, of which the stocks have a total par value of $59,922,000, carried at a book value of $32,675,000, and the bonds, including the Baltimore Ohio Terminal mentioned above, a par value of $38,074,000, carried at a book value of $33,986,000.

Sixty-five per cent. of the Baltimore & Ohio's total tonnage is furnished by products of mines, and the greater part of this is bituminous coal. Of the total 60,548,000 tons of revenue freight carried in 1911, 27,297,000 tons were bituminous coal. Naturally the Baltimore & Ohio gets a low ton mile rate, its average earnings per ton per mile on soft coal being 4.11 mills, while the average revenue on other commodities per ton per mile is 7.26 mills, making the average for all traffic 5.78 mills. There is a very interesting comparative statement of freight and passenger movement from 1888 to 1911 which shows, among other things, that the average rate per ton per mile has steadily decreased from 1888, when it was 6.56 mills to 5.78 mills in 1911. The average haul during these years has fluctuated from year to year, but has shown no definite movement either way. In 1888 it was 195 miles; in 1895 it was 154 miles; in 1901 it was 213 miles; in 1911, 193 miles.

The average rate per passenger per mile was 1.861 cents in 1888; it got as high as 2.016 cents in 1906, and was 1.911 cents in 1911. The average distance each passenger traveled varied from year to year without any marked tendency in either direction. The average journey in 1888 was 32 miles and in 1911 it was 36 miles. Freight density on the B. & O. is very heavy. The tons one mile per mile of road in 1911 totaled 2,640,000; the passengers carried one mile per mile of road totaled 180,000 in 1911.

The large increase in cost of conducting transportation in 1911 as compared with 1910 amounted to $3,080,000, making the total cost of transportation $32,818,000. This is very largely accounted for by increases in the cost of labor. For instance, station employees cost $3,886,000, an increase of $307,000 over 1910; yard conductors and their brakemen, $2,341,000, an increase of $301,000; road enginemen, $4,952,000, an increase of $514,000; and so on. To partly offset this increase in transportation expenses, there is a decrease of $1,382,000 in the cost of maintenance of way and structures, the cost in 1911 being $10,280,000. This decrease in maintenance of way cost was made possible by the very liberal expenditures that have been made in the past on upkeep and on betterment.

There was also a decrease in the cost of maintenance of equipment. The decrease amounted to $492,000, the total cost of maintenance of equipment in 1911 being $15,882,000. It will be recalled that last year the management, after a thorough appraisal of their equipment, charged off over $8,000,000 as the difference between the appraisal value and the book value of equipment. In 1911, $623,000 was charged for depreciation of steam locomotives, an increase of $122,000 over the charge for depreciation in 1910; and $1,518,000 was charged for depreciation of freight train cars, an increase of $227,000 over 1910. This is very decidedly a step in the right direction, for if an account for depreciation is to be set up and a charge made, it ought to be one that is figured on an actual basis of the rate at which equipment is becoming worn out and should not be varied accordingly as the company desires to make a good showing under adverse conditions. The charges made in the past for depreciation by the Baltimore & Ohio were probably not adequate. The wisdom of the new policy in regard to equipment is shown by a decrease of $712,000 in the cost of repair of freight train cars despite higher labor costs, the total in 1911 for this account being $5,250,000. During the year 187 locomotives, 8,272 freight cars and 26 passenger cars were added to the company's rolling stock, while 37 locomotives, 10 passenger cars, 3,202 freight cars and 335 work cars were condemned, destroyed or sold; and in addition, the Baltimore & Ohio Equipment Company received 177 new locomotives and 8,000 new freight cars which the Baltimore & Ohio rents.

The following table compares the principal figures of operation for the Baltimore & Ohio in 1911 and 1910:

	1911.	1910.
Mileage operated	4,434	4,434
Freight revenue	$67,629,937	$69,408,113
Passenger revenue	15,208,432	14,485,585
Total operating revenue	88,145,004	88,901,252
Maint. of way and structures	10,279,616	11,661,410
Maint. of equipment	15,881,620	16,373,776
Traffic	1,948,966	1,877,204
Transportation	32,818,500	29,738,992
Total operating expenses	62,766,067	61,333,801
Taxes	2,596,250	2,469,964
Net operating income	22,634,375	24,497,854
Gross corporate income	27,530,973	28,715,752
Net corporate income	12,819,991	16,247,587
Additions and betterments through income	.....	415,761
Dividends	11,476,145	11,474,213
Surplus	1,343,846	4,357,614

WABASH.

MR. DELANO, in a thoughtful, frank statement, in the annual report, discussing the management of the Wabash Railroad, says: "Speaking in general terms of the company's present condition and future prospects, it is gratifying to point out that it has reached an earning capacity of practically $30,000,000 gross, or approximately $12,000 per mile, being about double the figure 12 years ago, and this has been accomplished with only a moderate increase in facilities . . . Every investigation of Wabash conditions—and there have been many, both by interested and disinterested parties—confirms the statement that the property as it stands has been well maintained, but that it might, if cash were available for needed betterments and improvements, greatly increase its earning capacity and decrease its operating ratio. The Wabash, with its short lines between St. Louis and Kansas City, St. Louis and Omaha, St. Louis and Chicago, St. Louis and Detroit, Chicago and Detroit, Chicago and Toledo, and Kansas City and Detroit, lags behind its competitors both in volume of business and in cost of doing it because it has not the adequate facilities. The difficulty is a financial one and has been beyond the power of the management to remedy."

It is first of interest to see whether railway investors and owners of railway securities agree with Mr. Delano in his estimation of the intrinsic value of the property. Taking the market price of Wabash securities that are quoted on the New York Stock Exchange as of Friday, October 20, and adding thereto the par value of equipment trust certificates and minor obligations which are not quoted on the Stock Exchange and which latter only total $300,000, we find that the total market value of the Wabash is about $115,350,000. This compares roughly with a book value of $209,470,000, as carried on the balance sheet of the company itself.*

In the fiscal year ended June 30, 1911, the Wabash earned $4,450,000 net revenue applicable to interest. This is 3.87 per cent. on the market value of the property; in other words, the market value of the property is very considerably higher than the earnings in 1911 available for interest payment would in themselves justify. This, at a time when standard railway securities are not quoted at high prices on the New York Stock Exchange, strongly tends to show that investors in general agree with President Delano in believing the property to be worth more than it is now earning.

The other statement of President Delano, that the property had been well maintained, would appear to need interpretation "in the light of reason," and apparently cannot be taken as meaning as well maintained as its competitors. The Cleveland, Cincinnati, Chicago & St. Louis operates through much

*This figure ($209,470,000) is arrived at by adding together the capital obligations carried on the liability side of the balance sheet. Current liabilities and current assets are disregarded, the difference between them being discounted in the market valuation of securities.

of the same territory that is covered by the Wabash. The Big Four has a very large proportion, however, of branch line mileage on which traffic is light and which does not require by any means as much maintenance work as main line mileage to keep in fit condition to economically handle traffic. In the last two years the Wabash has relaid 164 miles of line with new steel rails (80-lb. rail). This is one-fifteenth of its total mileage. During the same two years the Big Four has relaid one-tenth of its total mileage, nearly all of which has been relaid with 85-lb. rail. In the case of both companies, this excludes second-hand rail relaid. In the last two years the Wabash has placed in main track an aggregate of 787 ties per mile of main track. During the same two years the Big Four has placed in main track 1,110 ties per mile. This would indicate that the Wabash has been maintained as well as it was possible under the circumstances."

The fact is that, as time goes on, the results of operation of the property only tend to show more strongly that the operating management is making an up-hill fight against disheartenningly difficult financial restrictions imposed by gross financial mismanagement in the past; and, to add to its own financial difficulties, the Wabash is still involved in the difficulties of the Wheeling & Lake Erie and the Wabash-Pittsburgh Terminal —difficulties which were imposed by the ill-fated attempt to gain an entrance into Pittsburgh.

On the balance sheet this year there is shown as an asset $9,816,211 Wheeling & Lake Erie 3-year notes with interest thereon, which notes are guaranteed by the Wabash and which fell due in 1908, but which the W. & L. E. are unable to take up. As an offsetting liability on the Wabash balance sheet there is $9,808,000 obligations to bankers in connection with the W. & L. E. notes.

Here certainly is presented a financial problem of a road which in the best interests of the shipping and traffic public should be maintained and improved to the fullest extent, a problem which might well form a special study for the Hadley Securities Commission before any rigid law were recommended for the regulation or restriction of the issuance of railway securities. This study might be of equal profit both as to the mistakes of the past and as showing what problems must be solved for the future.

The Wabash operates through very highly competitive territory. In 1911 it handled 14,140,000 tons of revenue freight, with an average haul of 237 miles and an average ton mile revenue of 6.03 miles; in 1910 the total tonnage was 14,000,000 tons, the average haul the same as in 1911, and the average ton mile rate 5.86 mills.

The average train load of revenue freight was 344 tons last year, as against 353 tons the year before and 352 tons in 1909. And the smaller train load is not due to any fault of the operating department; it is due to the lack of sufficient equipment, as well as an increase in high grade traffic and a decrease in slow moving business, such as coal. The extraordinarily high figure of $1,024,000 debit balance of hired equipment is in itself a striking illustration of how badly the Wabash needs new equipment. President Delano says that during the entire year there was a large surplus of coal equipment, the coal business being stagnant, but during most of the time the company was short of other classes of equipment and was therefore forced to use foreign cars.

In 1911, of the total tonnage carried, 18.66 per cent. was furnished by products of agriculture, 8.63 per cent. by animal products, 31.77 per cent. by products of mines, 7.69 per cent. by products of forests and 22.92 per cent. by manufacturers. The principal gain during the past three years has been in the tonnage of manufactures carried. In 1909, 19.20 per cent. of the total tonnage was manufactures, as against 22.92 per cent. in 1911; while on the other hand, products of mines furnished 36.18 per cent. in 1909, as against 31.77 per cent. during the year 1911.

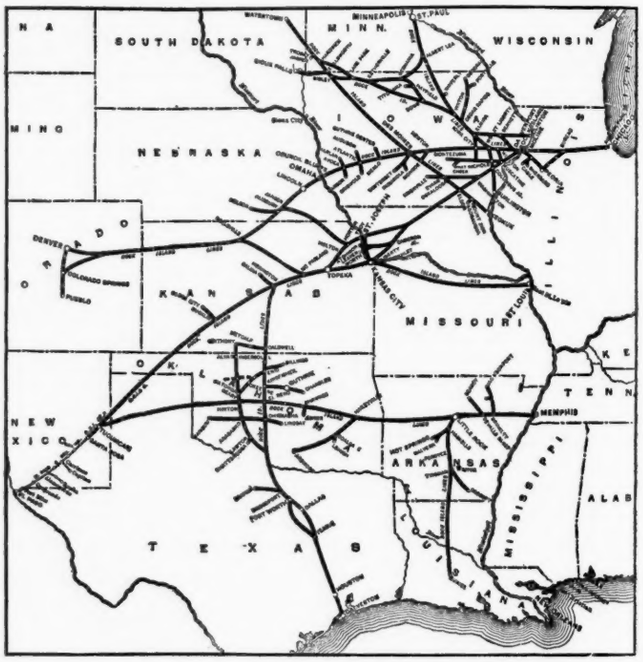
The following table shows the results of operation of the Wabash in 1911, compared with 1910:

	1911.	1910.
Average mileage operated	2,515	2,515
Freight revenue	$20,160,877	$19,473,373
Passenger revenue	7,400,934	7,075,314
Total operating revenue	29,884,037	28,886,056
Maint. of way and structures	3,629,763	3,600,739
Maint. of equipment	4,868,474	4,117,109
Traffic	919,043	928,784
Transportation	12,052,964	11,056,061
Total operating expenses	22,366,183	20,536,223
Taxes	920,873	851,324
Operating income	6,596,982	7,498,510
Gross corporate income	7,228,997	8,190,331
Net corporate income	601,579	1,815,719
Interest on debenture A bonds	210,000	210,000
Interest on debenture B bonds	795,000	1,060,000
Surplus	*403,421	545,719

*Deficit in 1911.

CHICAGO, ROCK ISLAND & PACIFIC.

THE Chicago, Rock Island & Pacific Railway—the company which owns and operates the railway lines and whose stock is held by the Rock Island Company—made an all-around good showing in the year ended June 30, 1911, that is really refreshing to study in the present times of uncertainty and threatened



The Chicago, Rock Island & Pacific.

business depression. The company's gross earnings were $68,040,000, or 3.46 per cent. more than in 1910; its operating income was $16,723,000, or 9.48 per cent. better than in 1910; and after the payment of 5¼ per cent. dividends (¼ per cent. more than in pervious year) to the holding company, it had a surplus of $1,512,000, as compared with a surplus the year before of $1,005,000. The company was able to make a saving of 8.86 per cent. in maintenance of way and structures, its transportation expenses only costing 3.87 per cent. more in 1911 than in 1910; and with all this it is in first class physical condition and its motive power during the year was kept in very good shape.

Conditions were favorable for a good showing. The weather was far more favorable last year than the year before; the corn crop especially was a record one, and the Rock Island benefited accordingly. The credit, however, for putting the property, especially the roadbed, in as good condition as it was kept last winter is due not to any fortunate outside circumstances, but to

the policy of the management of the road and to its officers.

The Chicago, Rock Island & Pacific operates 8,026 miles of line, and because of the smallness of the scale of the accompanying map, one has to study it with some care to appreciate how large and how spread out a system the C. R. I. & P. really is. It was probably in consequence of the difficulties of operating such a property as this as a single unit that led to the adoption of a considerably changed organization during the past year. The road was divided into three districts, and a general manager and a general superintendent and superintendent of motive power was appointed for each one of these districts. The new organization was described in the *Railway Age Gazette* of February 3, page 189, and it is generally believed that this new organization is working very well indeed.

Naturally with lines in Minnesota and Iowa, and also in Texas, Louisiana and Arkansas, the traffic as a whole is quite diversified. The most important tonnage is that furnished by products of agriculture, and in 1911, of the total 19,118,000 tons of freight carried, 4,949,000 tons, or 25.88 per cent., was products of agriculture. This is an increase in the tonnage of such products of 706,000 tons, or 16.66 per cent. Products of mines furnished 5,632,000 tons of traffic, or 29.46 per cent. of the total traffic, and the tonnage carried in 1911 was less by 488,000 tons, or 7.98 per cent., than in 1910.

With the decrease in low grade traffic we expect to find an increase in the ton mile rate received, but as a matter of fact, the revenue per ton per mile was just the same in 1911 as in 1910, namely, 9.2 mills; and despite less low grade tonnage, the average revenue train load was 270 tons in 1911, as against 257 tons the year before. There was also a large increase in the number of tons of company freight per train. This company freight averaged 50 tons per train in 1911, as compared with 40 tons in 1910, so that there was an improvement in total train loading of 23 tons. The total number of tons of freight carried one mile in 1911 was 4,718,000,000, an increase of 151,000,000 ton miles. This increase in ton mileage was due entirely to an increase in the average haul, the average haul of revenue freight in 1911 being 247 miles, as against 238 miles the year before. Of course, the average freight density on a property with as widely different conditions on different parts of the system as the Rock Island, does not tell much as to condition of operation on any given line. The average density in 1911 was 588,000 ton miles, as against 568,000 ton miles the year before, showing an increase of 20,000 ton miles during the year.

In regard to the ton-mile rate received and the fact that it was no higher last year, despite the smaller amount of low-grade traffic, it may be safely said that multitude of decisions of the Interstate Commerce Commission making small reductions in rates, unimportant in themselves but surprisingly large in the aggregate, is in part responsible. The Rock Island also, with its lines extending from Texas to Wisconsin, gets into all varieties of classification territories, and so it is sure to be hit by every change of classification.

On the Rock Island, passenger revenue is about 29 per cent. of total operating revenues. Last year the revenue from passengers amounted to $20,241,000, an increase of 4.45 per cent. over 1910; the total number of passengers carried was 19,842,000, a decrease of 295,000, and the passenger mileage was 1,010,000,000, a decrease of 6,000,000. The revenue per passenger mile was 2 cents in 1911 and 1.91 cents in 1910. The average haul is quite short and totaled only 51 miles in 1911 and 50 miles in 1910.

During the year the Chicago, Rock Island & Pacific increased its funded debt outstanding by $2,160,000. The company spent $3,511,000 for additions and betterments, of which but $86,000 was for equipment and the remainder for improvements to the right of way and buildings. Included in these expenditures for additions and betterments is $604,000 for ballast, $357,000 for terminal yards, $218,000 for block and other signal apparatus. Automatic block signals were installed on the line from Eldon, Iowa, to Cameron Junction, Mo.; from Linn Junction, Iowa, to Vinton, and from Neola to Council Bluffs; and from Irving, Tex., to Fort Worth, a total of 229 miles. This makes a total of 963 miles of automatic signals now in operation on the Rock Island lines.

The balance sheet shows cash on hand at the end of 1911 of $3,242,000, which is a decrease of $1,299,000 during the year. Working liabilities totaled $9,258,000, a decrease of $747,000 during the year. There are no loans and bills payable and but $240,000 miscellaneous accounts payable.

As has been mentioned, the Chicago, Rock Island & Pacific did comparatively little new financing on its own account, but during the year there were sold $10,000,000 first mortgage bonds of the St. Paul & Kansas City Short Line, which bonds are guaranteed principal and interest by the Chicago, Rock Island & Pacific. These bonds were issued to the C. R. I. & P. in exchange for the stock and bonds and other indebtedness of the St. Paul & Des Moines, which operates the line from Des Moines, Iowa, to Mason City, 121 miles, and for an advance of $4,000,000 to the St. P. & K. C. S. L. to build a line from Allerton, Iowa, to Carlisle. This line will be finished about September 1, 1912, and when it is completed the Rock Island will have the shortest route by 43 miles between St. Paul and Kansas City, the distance by the Rock Island being 489 miles. There are quite extensive coal mines now being developed which will be tributary to the new line between Carlisle and Allerton, and it is expected that this new line will put the Rock Island in a considerably better position to compete for north and southbound traffic.

One trouble that the Rock Island has in competing for traffic is the lack of terminal facilities of its own in some of the more important cities which are tributary to its lines. The Rock Island taps nearly all of the most important cities in the Middle West and Southwest.

Its service is fully up to that of its competitors and its physical condition is as good as most of its competitors, but the traffic officers of the road are hampered because of lack of facilities belonging to the Rock Island and actually lying within some of the big cities. On the other hand at Chicago the C., R. I. & P. enters the city in such a way that it can deliver freight to all of the eastern roads, an advantage held by no other western road. During the year 150 new industries, estimated to cost nearly $12,000,000 and to furnish 46,000 carloads of revenue freight, were located on the Rock Island lines, and during the year industrial side tracks were built to six great mines and to private industries.

The prosperity of the country lying along the Rock Island's line from Kansas City southwest to a connection with the El Paso & Southwestern has been very great in the last few years. Country that made only fair grazing land has been put under cultivation and is proving to be highly valuable agricultural land. Farmers are becoming well-to-do; labor is in good demand and commands high prices at harvest time and fairly good prices at other times, and in this prosperity the Rock Island is now sharing.

The following table gives the principal figures for operation in 1911 and 1910:

	1911.	1910.
Average mileage operated	8,026	8,044
Freight revenue	$43,368,396	$42,218,881
Passenger revenue	20,240,528	19,378,174
Total operating revenue	68,487,473	66,220,579
Maint. of way and structures	9,738,016	10,673,387
Maint. of equipment	9,359,749	8,455,746
Traffic	2,007,150	1,795,262
Transportation	26,171,419	25,195,579
Total operating expenses	19,431,790	18,151,210
Taxes	2,708,651	2,876,701
Operating income	16,723,139	15,274,509
Gross corporate income	16,908,616	15,497,741
Net corporate income	5,442,714	4,747,881
Dividends	3,930,948	3,743,272
Surplus	1,511,766	1,004,609

NEW BOOKS.

Railways and Nationalization. By Edwin A. Pratt. *The Railway Gazette,* London. 455 pages. Price 2s. 6d.

By railway nationalization Mr. Pratt means both government ownership and government operation of railways, and he discusses the merits of both from a strictly English point of view. The chief interest, therefore, to an American lies in the comparison that he can himself make while reading the book between this English point of view and what he knows of conditions in the United States. The book is an argument in a controversy and the tone is often quite controversal. At times one is inclined to wish that Mr. Pratt had examined his subject from a somewhat more judicial standpoint, not, of course, but what he is right in the conclusions that he draws, and we would not doubt his facts, but he has a tendency to quote from authorities or observers who tell only one side of the case. For this reason his conclusions that government ownership and operation are detrimental to the best interests, both of shippers and of the public at large, lose some of the force that they would have had if both sides of the controversy had been somewhat more fully presented. The work was originally published in 1908, but the present edition amplifies and brings down to date the entire discussion. Mr. Pratt first shows the difficulties that other countries have had in financing state railways and shows to what extent railway management has suffered from being mixed with politics. In England the labor party has been an advocate of government ownership, and Mr. Pratt discusses quite fully and in a practical way the effect that government ownership would have on railway labor. He points out the great danger that lies in a general strike when the government itself is one of the interested parties, and shows in a very convincing way that such a strike puts the government in a very embarrassing position and yet leaves no disinterested party to turn to who can act as an arbitrator. In the discussion of state vs. company management and "traders" and their grievances, it is rather interesting to note how often such catch words used in this country as "watered stock" are also used in England without any real knowledge of actual conditions. Of course, a great number of traders' grievances are based on entirely different conditions than exist in the United States, and for this very reason the discussion on that subject should be particularly interesting to both shippers and railway men in this country. It often illustrates how much in the way of service for the small shipper is demanded from railways in England, and is a good object-lesson in how cheap American railways are performing the business of transportation. A considerable discussion is devoted to the working of state railways now being operated by the governments of foreign countries, and here again, while the conclusions are correct, we believe the quotations are largely drawn from authorities opposed to government ownership. Mr. Pratt takes a quite different view of the British railway position today from that taken by Mr. Acworth in his paper written for the International Railway Congress bulletin. It is, however, an interesting point of view and one worth understanding. To any student of the general subject of government ownership, regardless of whether it is to be applied in the United States or not, the book should prove of great value, especially as a source of suggestions for further investigation from original sources.

Heavy rains were responsible for the blocking of the Cairns Railway, in Queensland, in 36 places, some of them being half a mile in length. Traffic was interrupted from March 31 to April 28, and during that time an immense amount of work was accomplished in rendering the lines fit for operation. The line was blocked by earth, rock and logs, by washaways and landslips, by tunnels caved in and by streams being diverted across the roadbed. For a distance of 550 yds. the road subsided from 10 to 15 ft. except for about 60 yds., where it was covered by earth and large boulders to a depth of from 15 to 20 ft.

THE PROSPECTS OF STATE OWNERSHIP OF RAILWAYS IN ENGLAND AND IN THE UNITED STATES.*

BY W. M. ACWORTH.

Two or three years ago, I was discussing railway questions with one of the most distinguished professors of economics in the United States, and the professor, who has paid special attention to railway matters, said to me: "National ownership will not be a live question in the United States for fifty years to come, unless, indeed, England should nationalize her railways. In that case, I admit that the question might at once become urgent with us." I am persuaded that my friend would not repeat his statement today. I have recently spent some time in the United States and have had considerable opportunity of learning what leaders of public opinion are saying, and still more thinking, at this moment. Having regard not only to the actual situation in the two countries, but also to the very different temperaments of the two peoples, it appears to me more than possible that the United States will lead England in adopting a policy of railway nationalization; and this not after a lapse of fifty years, but in the near future. I recognize that in the United States there are obstacles to nationalism that do not exist in England. The instinct against government management and in favor of private enterprise is much stronger there than it is here nowadays. And the instinct is based on concrete facts; for it would, I think, be generally admitted that government agencies in America are on the whole less efficient than in England, and that a smaller proportion of the best brains of the country are enlisted in America in government service. Moreover, in America there would be greater danger—I almost feel tempted to write "greater certainty"— that, in the words of President Hadley, "politics would corrupt the railway management, and the railway management would corrupt politics." Further, there is in America the certainty that nationalization of railways would raise in an acute form the question, sometimes dormant but never dead, of state rights.

For all these reasons it would seem that, if railway nationalization is to come in a great Anglo-Saxon community, England and not America would surely lead the way. But there are causes, and they may turn out to be very potent causes, working in the other direction. In England our railway system is practically complete; there is very little necessity for the expenditure of new capital. Indeed, with the increased attention that has been paid in recent years to economical operation, it has been found in some instances that accommodation has already been provided out of capital in excess of the requirements of existing traffic, and that there is a comfortable margin of accommodation available to meet the steady but comparatively slow growth of new traffic. Moreover, English conditions of business, whether it be the business of railway companies themselves or of their customers, are comparatively stable. We never see in England the tremendous increase of traffic such as the American railways had to face in the years 1906 and 1907; nor do we see such sudden collapses as the American roads had to face at the end of 1907, when the traffic of some companies shrank within a few months, if I remember right, by something like 25 per cent. We are not in England, as it seems to me, likely to be confronted with a sudden crisis in railway affairs. Such a crisis not only may come, but quite likely may overtake American railways ere long. And if the outcome of that crisis were the nationalization of American railways, I do not think anyone would be entitled to feel that the unexpected had happened. I am not attempting to prophesy. In a subject complicated by so many varying and conflicting conditions, economic, financial, personal, political and racial, it would be absurd for anybody to prophesy. If I have an individual belief, it is that the United States will get much nearer to the brink of nationalization than they have come at present, and will then start back on the edge of the precipice and escape by

*From the *Bulletin of the International Railway Congress Association* (English Edition)—issue of August, 1911.

some road not yet discernible. Refraining from prophecy, I only desire to sketch the forces at present at work and to call attention to their apparent tendency.

We have been accustomed to regard America as pre-eminently the country of unrestricted private enterprise in railway matters. Speaking broadly, this was undoubtedly true till comparatively recently. It is certainly not true any longer. At the present moment American railways are distinctly more closely controlled by government authority than are the railways in England. So far as concerns traffic within the limits of a single state, government control has been both stringent and minute in some states for many years. For twenty years past within the great state of Texas, which is as large as France, no railway company has had power either to vary an old rate or to introduce a new one. The authority to make rates has been vested in the state railway commission, and without the sanction of that commission no railway company can raise a single dollar of new capital. Texas led the way in this direction, and for a good many years Texas stood alone. But recently Texan precedents have been followed pretty widely, and it is substantially true to say today that, over a considerable portion of the Union, the individual states have taken away from the railway companies control of their own business, whether it concerns rates, services, or the raising of capital and the amount of its remuneration.

But the railway business of the United States is in the main done, not by small companies confining their operations within the limits of a single state, but by great corporations ramifying in some cases over ten or twenty states. An overwhelming proportion of the business of these companies is interstate, and, as such, escapes the jurisdiction of any individual state, and is subject only to the control of the federal government.

Federal control of railways is comparatively new—its history only begins in 1887—and has only become serious within the last few years, but nowadays, it is serious enough in all conscience. American railways have led the world in the introduction of economies the control of operation expenses by means of scientific accounts and comparative statistics. But, unfortunately, American accounts of receipts have not always been as admirable as their accounts of expenditure. In the bad old days, gone, one cannot but believe, forever, and gone not in consequence of government action, but almost wholly as the result of reforms made from the inside by the companies themselves, it was not uncommon that one set of books showed what the trader ought to have paid, but did not, for the carriage of his traffic; and another set showed what he actually paid when the secret rebates were deducted. Nowadays the government has intervened with the heavy hand the crude methods common where governments interfere, and laid down that every railway company engaged in interstate commerce shall keep the accounts prescribed by the Interstate Commerce Commission, and these accounts only; that these accounts shall be at all times open to government inspection and that, if any railway officer keep any account not expressly authorized by the commission, he shall incontinently be sent to prison.

But this is not by any means the most serious interference of the American government with private railway enterprise. In the words of Mr. Prouty, one of the ablest and most experienced members of the Interstate Commerce Commission: "Its rates are a most vital thing to the railway. It is for the sole purpose of charging these rates that the railway is built and operated. Whatever affects the amount of these charges touches in its tenderest point the welfare of the railway corporation. From the standpoint of the railway itself, this matter is of supreme consequence." The rates of the railway, "this most vital thing," "this matter of supreme consequence," have nowadays passed from the control of the railways themselves and are subjected to the authority of the Interstate Commerce Commission. In England, a railway company can not put in force an increase of rate to which any trader objects without the sanction of the Railway Commission; but in America the Interstate Commerce Commission, either on the complaint of a trader or on its own motion, can enquire into the reasonableness of any rate actually charged, and can, if it thinks fit, substitute a new and lower rate in place of it.

Nor is this all. A few of the great trunk lines of the states, which occupied at the outset the main strategic routes are now, especially, where they have been honestly and conservatively financed all through their history, in a position of great prosperity. Public opinion and the Interstate Commerce Commission agree in questioning their right to the dividends they are at present earning. Mr. Prouty, from whom I have already quoted, has publicly stated that "only in extreme cases would a larger dividend than 7 per cent. upon the capital stock be justified." And the commission—and that they have public opinion behind them no one who knows the United States can doubt—have gone even further than this. The Pennsylvania system is not only the greatest private undertaking in the world—its annual revenue exceeds $350,000,000—but its financial standing is second to none. No one has ever suggested that one single dollar of its capitalization represents anything but honest money put into the road; no one doubts that the undertaking today is worth vastly more than the price at which it stands in the company's books. For a generation past the shareholders have been content with very moderate dividends, averaging less than 6 per cent., and have spent the balance of net revenue on capital improvements. The president of the company stated recently before the Interstate Commerce Commission that since 1887 "his company had put into the Pennsylvania lines east of Pittsburgh" (which are only one portion of the entire Pennsylvania system) "$262,000,000 from earnings." That the Pennsylvania shareholders were entitled both morally and legally to put every dollar of these millions into their own pockets as dividends is unquestionable. One might even have imagined that their self-restraint, which resulted in keeping down the capital on which the customers had to supply a dividend, was deserving of encomium. That, however, is not the view of the commission, whose decision says: "During all that time this company has always paid to its stockholders munificent dividends. Now to whom belongs this $262,000,000? . . . There is the gravest doubt upon this point. . . . Whatever is invested in these properties from earnings *may belong,* not to the public which has paid for it, but *to the stockholders* who have already received a full return for their investment in the way of a dividend." [The italics are mine.]

To complete the outline of the story, it should be added that state and federal interference with the actual daily operation of the railways has already gone far and is steadily increasing. Peremptory orders to run such and such trains, to provide such and such accommodation on them, to build new stations here, to reconstruct lines there, so as to avoid crossing streets on the level, are increasing every year both in number and severity. Laws dealing with the provision of safety appliances, regulating the number of employees on a train, or the number of hours these employees are to work, have been turned out by the hundred within the last decade. In this respect also the railways of the United States are subjected to interference more drastic and much more detailed than anything to which the English roads are subjected. And, whereas government regulation in England dates back to the beginning of railways, and has only been strengthened gradually and at considerable intervals, this whole mass of government regulation in the States has been piled in the course of quite a few years upon the backs of officers brought up under a system of almost entire freedom from exterior restraint.

Not unnaturally the American railway men, buffeted by such fierce and frequent storms coming on them from every direction at the same time, have lost their bearings. Government control, they say, they could live with, if it were steady and uniform and consistent. But government interference that is often self-contradictory, that never helps or guides or supports, that only objects and obstructs and forbids, in the end becomes impossible for all private initiative is paralyzed. And to say that this is the position in the United States today, is only to state what is obvious.

Twenty-five years ago President Hadley in his well-known book, "Railroad Transportation," wrote as follows:

"There is a strong popular feeling, to a large extent unsuspected by those in authority, in favor of government ownership of railways as a system. No one can have much to do with the more thoughtful workingmen without finding how strong that feeling is, and what hopes are based upon it. The fact that the question is not now under discussion must not blind us to the fact that forces are at work which may prove all but revolutionary when the question actually does come under discussion."

Government ownership did come under discussion in 1905 when Mr. Bryan, who had twice been candidate for the Presidency and was about to be renominated by his party for the third time, startled the American public by declaring himself in its favor. At that date, as I well remember, for I was myself in America at the time, Mr. Bryan appeared to be in a minority of one. The democrats were hardly less unanimous than the republicans in disavowing all sympathy with his ideas. But things change fast in America, and here are one or two quotations to show what typical public men in the states are saying today, now that the question is once more under discussion.

Mr. Finley, president of the Southern Railway, with more than 10,000 miles of line, says:

"I do not believe that the sentiment of the majority of the people of the United States is favorable to government ownership, nor do I believe that congress and our state legislatures are consciously moving in that direction, but I do believe that, if some of the more extreme legislation already enacted is supplemented along the lines now proposed, the ultimate result must be to break down the system of private ownership."

Mr. Olney, a democrat and ex-secretary of state, says:

"The situation is this. As a matter of theory, Bryan favors government ownership of railways on the anticipated failure of government regulation. As a matter of practice, Roosevelt and his disciple, Taft, are favoring a kind and degree of government regulation of railways which makes the government ownership of railways both logical and imperative."

Senator Lodge says: "The curse of government ownership may be forced on us." Senator Clay, that "public sentiment in favor of government ownership is growing every day."

The situation as I see it is this. A mass of public opinion growing larger day by day is crystalizing in favor of government ownership. Even among those who believe this to be undesirable, there are many who have become convinced that it is inevitable. And this view they hold not without good reason, for the railways of the country must be managed by some one; if the companies cannot, the government must. And, as I have said, as the result of the tempest of drastic and even hostile legislation that has raged round them within the last few years, the railway men no longer know where they stand. The cost of operation has been going up against them by leaps and bounds. The wages of railway employees have not only gone up, but have gone up out of all proportion to the wages of any other comparable employment. In the deep depression of 1908 the companies attempted to reduce their expenditure by cutting down wages. The whole force of the federal government was instantly brought to bear upon them and they were compelled to abandon the attempt. Foiled in this direction, they tried to increase their receipts by raising rates. They were promptly confronted with an injunction moved for by the government, and were compelled to postpone their proposed increases till legislation could be passed through Congress giving the Interstate Commerce Commission jurisdiction to decide as to their reasonableness. And now after exhaustive inquiry, the commission has within the last few months unanimously decided that no increase shall be permitted.

To justify the proposed increase, the railway companies naturally painted in dark colors the prospects of the future. The surplus over dividends which they had been accustomed to devote to betterments and improvements had, they said, almost vanished. The dividends themselves were in danger. The security on which new and urgently needed capital must be raised was gravely imperilled. The commission, it is true, refused to take them at their word, and declined to admit that the gloomy prognostications of the companies were justified by the facts. But it is no part of the duty of the commission to find capital for the companies, and there is no denying that, on the one hand, the companies are hesitating to incur new liabilities, and that, on the other, the public are less ready to purchase railway securities than they were. Securities of the great companies can, of course, be sold, and are constnatly being sold; but they are only sold at a price that a few years ago would have been regarded as prohibitive.

Now the need of American railways for new capital is almost limitless. The volume of traffic in the Uited States increases at a rate of which older countries have no idea. Roughly speaking, the volume doubles every ten or twelve years. This of itself implies vast capital expenditure. But this is not all. During the period extending roughly from 1895 to 1905, the railways restricted their capital expenditure within the narrowest possible limits, and the arrears of these years have by no means been caught up yet. Moreover, it is not merely a question of enlarging the plant to meet a growing demand: it is also a question of raising the whole standard of accommodation to a higher plane. The railways of a few great companies along the Atlantic coast are constructed and equipped up to a standard of perfection that is surpassed nowhere in the world; but over the larger part of the continent the railways have still in very many cases not yet emerged from the condition of what the Australians call "pioneer lines." There is, indeed, always, or almost always, a track with heavy rails, well built and well maintained. But the track, even through the streets of great towns, runs on the level down the middle of the street, the stations are often mere shanties; signals are non-existent, and all the accessories that go to make up a railway, according to Continental and still more English ideas, are plentifully lacking. The money needed to bring up the railways of the West to the standard set in the East is quite incalculable. But that it will have to be found, and that the American public will vent their wrath upon the railway companies, if it is not found, seems to me certain. The results may well be that the government will have to undertake a work that the companies find too heavy for them. And it is not probable that the government will undertake to finance railways which it does not own. As I have said, I do not care to prophesy. Factors that at present seem unimportant may turn out to be preponderating. But at this moment it looks as though before long the history of 1906-1907 would repeat itself. In these years trade was booming, and the railways found their resources quite inadequate to cope with the rush of traffic with which they were confronted. All the signs at present point to a similar sudden outburst of activity in the near future. If it comes, and if the resources of the railways are overpowered by it as they were five years ago, it is quite conceivable that private ownership in the States may be submerged by a great wave of popular indignation.

History shows not a few instances in which the railway policy of a country has been reversed within a very brief period. In the year 1879, the Prussian Landtag rejected Bismarck's system of state purchase by an almost unanimous vote, and six months afterwards in a new Landtag the purchase of the first great block of what is now the Prussian state railway system was carried by a large majority. In 1891, the Swiss people on a referendum rejected the purchase of the Swiss Central Railway by a two to one majority. And in 1898, also by a referendum, and also with a two to one majority, they voted for the purchase of all the main lines of the country. In June, 1903, the Italian Chamber of Deputies accepted, almost without hesitation, the report of a railway commission advising against state purchase. And in June, 1905, by an act passed almost without discussion, the Italian government took over the railways. In France, too,

the Chambers of Commerce were practically unanimous in opposing the purchase of the Western Railway by the state. Their opposition was supported by a very great majority of the deputies and senators representing the district which that railway serves. But Mr. Clemenceau passed his bill and the "Compagnie de l'Ouest" is now "l'Ouest-Etat."

To turn from the stormy strife of American railway politics to the drowsy atmosphere which surrounds similar questions in England is like passing from a stinging North Seat gale into some land-locked Norwegian fiord. Some two years ago I wrote in the *Bulletin**: "The old edifice of the English railway system is tottering to its fall, and no one yet knows what will take its place." I ought, perhaps, to have added that the public and Parliament are entirely unaware that there was a system, and that it is tottering; and that none of the leaders of public opinion have as yet addressed their minds to the question of what is to take the place of the system, of whose existence and of whose disappearance they are still unconscious. I remain, however, of opinion that my diagnosis of two years ago was correct. The old system is dead. Even in a rule-of-thumb country like England it must be replaced by some other system; and no serious attention has yet been given to the question what that system is to be.

In my article of two years ago, I was attempting to summarize the report of a board of trade conference. Within the last few weeks the board of trade has published a new report: the report this time of a departmental committee on railway agreements and amalgamation.† The committee was apointed in June, 1909. It consisted of ten members, of whom six were members of the legislature, three were lawyers with experience in railway matters, and one was apparently selected as a representative trader.

The committee were appointed to "consider and report as soon as practicable what changes, if any, are excellent in the law relating to agreements among railway companies, and what, if any, general provisions ought to be embodied for the purpose of safeguarding the various interests affected in future acts of parliament authorizing railway amalgamations or working unions." The report of the committee is a very interesting document. It covers 50 large and closely printed pages. It may be divided (though it is not so divided by the committee), apart from the usual narrative and historical introduction, into three main heads. These may be described as:

1. Should railway co-operation be encouraged?
2. If so, what steps should be taken for this purpose?
3. What consequential changes in the public regulation of railways will be required?

With past history we need not concern ourselves here. The committee discuss it under the various heads of competition in rates, in subsidiary charges, in facilities, in new lines, and miscellaneous. They come to the conclusion that competition as a regulative force is dead or dying, that effects produced by competition in the past still to some extent persist and will persist though the cause has ceased, but that it is not safe to rely upon their persistence for the protection of the public.

But they also report that they "have come to the further and unanimous conclusion that the natural lines of development of an improved and more economical railway system lie in the direction of more perfect understandings and co-operation between the various railway companies." This natural development cannot, the committee think, be prevented by legislative or administrative action. They, therefore, on all grounds consider that the public authority should encourage and not attempt to hinder it. They recommend accordingly that every opportunity should be given to railway companies to enter into public and binding agreements, whether for amalgamation, or division of territory, for pooling of traffic, or whatever it may be. The detailed changes, whether in statute law, or in the traditional procedure of parliamentary committees, which the committee consequentially recommend have no interest except for English readers, and may be passed by here.

The third head, which I have defined as "what consequential changes in the public regulation of railways will be required" under a non-competitive system, is naturally much the most important. And here, as it seems to me, the report takes a narrower view than we might have loked for. Broadly, the situation is this: A country must entrust its railways either to government management or to private enterprise. If the latter system be chosen, there are again two alternatives; the private railway system may be based either on competition or on monopoly. England and Holland (and, until recently, Italy) have deliberately adopted the competitive basis. France has, equally deliberately, adopted the opposite system, and has given to each company, as far as possible, a carefully protected monopoly within its own district. Each system can claim both theoretical and historical justification. But they are diametrically opposed; and each system *ipso facto* excludes certain advantages which the other confers. The French system avoids the waste of capital implied in the unnecessary duplication of lines, and of income in the unnecessary duplication of services. But, on the other hand, it confers on a company the opportunity of going to sleep with comparative impunity, and it necessitates the constant and persistent interference of the state to secure that the company shall give to the public accommodation that its own self-interest might often lead it to refuse.

Under a competitive system, on the other hand, even if a certain amount of so-called waste is inevitable, competition itself is the main regulative force. To order a railway company to build a new line required in the public interest, but not likely to be profitable directly or indirectly to the company that builds it, to run a new train that will hardly do more than pay working expenses, to reduce rates, to build better rolling stock, and so forth—all these are matters of such administrative difficulty that a government may well shrink from taking them in hand. Competition does the work automatically. Under a competitive system a company will probably build new lines, put on new trains, improve its rolling stock at an earlier stage than a government would under a non-competitive system have ventured to order them. Such at least would seem the natural expectation *a priori*, and it is an expectation that, I venture to say, finds strong confirmation in railway history.

The board of trade committee does not appear to perceive that a competitive system is one thing, and a non-competitive system another. They recognize that the English railway system has hitherto been based on competition; that the system of the future will have to be based on non-competition, and they apparently think that, with a certain limited amount of dotting of i's and crossing of t's, the regulation that was adequate under the one system will suffice in the other. At present, for instance, a railway company cannot increase rates without the permission of the Railway Commission Court. The committee recommend that in future the same permission shall be required in the matter of decrease of accommodation, and of some twenty different recommendations made by the committee, this is probably the most important. How it is to be carried out in practice one has difficulty in imagining. An express train, let us say, runs through between two important termini, A and B, a distance of 100 miles. It takes two and a half hours on the journey, and makes three stops at unimportant stations *en route*. The train is re-timed. The local stops are cut out. It does the 100 miles in two hours, but the passengers from the intermediate stations have to travel by a slow train. A hundred through passengers *per diem* save half an hour, but six local passengers lose a whole hour apiece. Has the railway company increased or diminished its facilities? To enter upon an elaborate lawsuit, with all the paraphernalia of counsel and witnesses, to prove by sworn testimony to the satisfaction of a law court that the inconvenience of the six ought to be regarded rather than the convenience of the hundred, is surely impossible. You can regu-

**Bulletin of the Railway Congress*, number of February, 1910, p. 985.
†Cd 5631.

late railways by act of parliament and by lawsuits, provided parliament and the courts are only to interfere in important cases where great interests are involved. But to tell a suburban passenger that he must apply to a law court for redress, if a company bent on economy postpones heating the local trains from November 1 to 15, is merely laughable.

And this is not all. A system of regulation that confined itself to preserving the *status quo* might have been justifiable in China in the last century. But England is a progressive country, and we want something better than the *status quo*. We want progressive improvement. Hitherto our railway companies have given it to us in ample measure. Fifty years of competition over the 400 miles from London to Edinburgh have brought down the length of the journey from eighteen hours to seven and a half hours. No one will say that the service of today falls short of the reasonable standard of today. But the resources of civilization are not yet exhausted, and there are no grounds for supposing that fifty years hence fifty miles an hour will be a reasonable speed for a through express. Yet, if competition is abolished, and the companies which at present compete agree to pool their traffic, there is no power to constrain them to accelerate. And the board of trade committee is content to leave it so. They discuss the question of "extension of the rights of the public to compel the railway companies to grant increased facilities and reduced charges where such a course could be proved to be reasonable," and they deliberately refuse to recommend any change in this direction.

And herein lies, as I think the future will show, the crux of the question. Of course, if we are to continue to rely on law courts and legal procedure for protection of the public, the committee is right. But to administer through the machinery of a law court the complicated affairs of a great business undertaking like that of a railway company is obviously out of the question. If control in this direction is to be exercised by public authority, it can only be by the administrative action of a department of the executive government, armed with powers similar to those possessed by the French ministry of public works. And, though the growth of the powers of our executive government in recent years is sufficiently conspicuous, it is very questionable whether English public opinion is ripe for so great a change as this. With railway matters so far, public attention has concerned itself but little. When, however, the public begin to pay attention and to understand the new situation; when they appreciate that the country has been divided up into districts, settled not according to the convenience of the public, but according to that of the railway companies; that the condition of things in the year 1911 is to be taken as the standard of reasonableness for all time, and that any further improvements and concessions are only to be obtained at the good pleasure of the railway companies, and only so far as it suits the convenience of the companies to concede them—then, as it seems to me, the recommendations of the board of trade committee will not command any general acquiescence.

The conclusion may be put very shortly thus. Competition is dead. It might have been possible to substitute for it a carefully thought out system of state regulation. No attempt is being made to provide such a substitute. The present position can accordingly only be very temporary, and the ultimate outcome can hardly be other than nationalization.

The Russian government proposes to build a new railway in West Siberia. The line will begin at Uralsk, on the Ural river, and proceed via Orenburg and Akmolinsk to Semipolatinsk; thence to Barnaul; from this point it will go due north to join the Siberian railway, probably at Ob, an important grain centre. The line is of great strategic and commercial importance, the reason for the sparse population of the district traversed being the absence of means of transportation. The new line will be more than 1,360 miles long, and its construction is expected to begin shortly at both ends. It should be open to traffic in about five years.

LESS RAILWAY LEGISLATION.

The Railway Business Association, in a pamphlet entitled "Constructive Railway Policies in Many States in 1911," has made an abstract of all of the general laws affecting railways which have been passed by state legislatures during the current year; and the officers of the association conclude that antagonism has diminished and that "the era of conciliation, conference and co-operation which this association was formed to promote, is manifestly dawning." Mr. Noxon, secretary of the association, has made a personal study of all of the laws, railway and other, passed by all of the 40 legislatures which have been in session, and concludes that the law-makers have definitely turned to "a period of legislative rest." He also quotes from the messages and other utterances of the governors of numerous states, to show that the importance of pursuing a reasonable policy toward the railways is now well understood. He says, further:

"Reports from the 40 states whose legislatures met in 1911 show that a marked tendency, already widespread, has developed in the direction of a constructive policy affecting railways, and in many instances affecting industry and business as well.

"A number of states not hitherto active in adopting railway restrictions enacted this year regulatory statutes, notably California, Illinois, New Jersey, Connecticut and New Hampshire. Several which already had many such laws passed additional provisions, evidently with the purpose of bringing their regulations into line with what had been tried elsewhere. But viewing the whole country the most far-reaching tendency is a diminution or complete cessation of law-making affecting the carriers. No less than 24 states passed little or nothing. Most striking of all, the states which have been pioneers in regulation and have up to a recent period done most in that direction seem to have nearly or quite given up the quest for further restrictions, and are now evincing anxiety to attract capital for the development of transportation and business.

"The laws passed directly dealing with the carriers were cut down in two years 58 per cent., or from 664 in 1909, when 41 legislatures were in session, to 276 in 1911, with 40 legislatures.

"Candidates for governor in Texas, Oklahoma, Alabama and Iowa went to the people on platforms promising to treat business and transportation enterprises fairly and constructively. All four were elected.

"Alabama, proclaiming formally a policy of protection to investments, repealed the law providing for the forfeiture of its franchise by any foreign railway corporation which carried to the federal courts an appeal made from a state-made rate.

"The states which passed many railway laws, mainly restrictive, are Arkansas, California, Indiana, Minnesota, North Dakota, Oregon, South Dakota and Wisconsin; and of these Arkansas reduced the number from 32 in 1909 to nine in 1911; Minnesota from 31 to 17; North Carolina from 50 to 8; Oregon from 20 to 10; South Dakota from 37 to nine; Wisconsin from 34 to 17. Michigan, although reducing the number of railway enactments from 32 in 1909 to six in 1911, passed mainly new restrictions, including reduction of freights and fares and the taxation of securities in the hands of holders. New Jersey, in enlarging the power of the Public Utilities Commission, enacted certain novel restrictions, though passing but seven railway laws as against 11 in 1909. Connecticut passed 8 laws, the most important creating a Public Utilities Commission with plenary powers.

"At the conference of Governors at Spring Lake, N. J., in September, Governor F. C. McGovern, of Wisconsin, testified that the public service corporations in that state are absolutely out of politics, and that there are now better and friendlier relations between the utilities and the public.

"At the present moment political leaders who advocate a far-sighted policy toward railways do receive the support of the voters. The railways and cognate industries have assiduously conciliated the public, and toward the railways the growth of public friendliness is now shown."

COLORADO & SOUTHERN EXTENSION TO CHEYENNE.

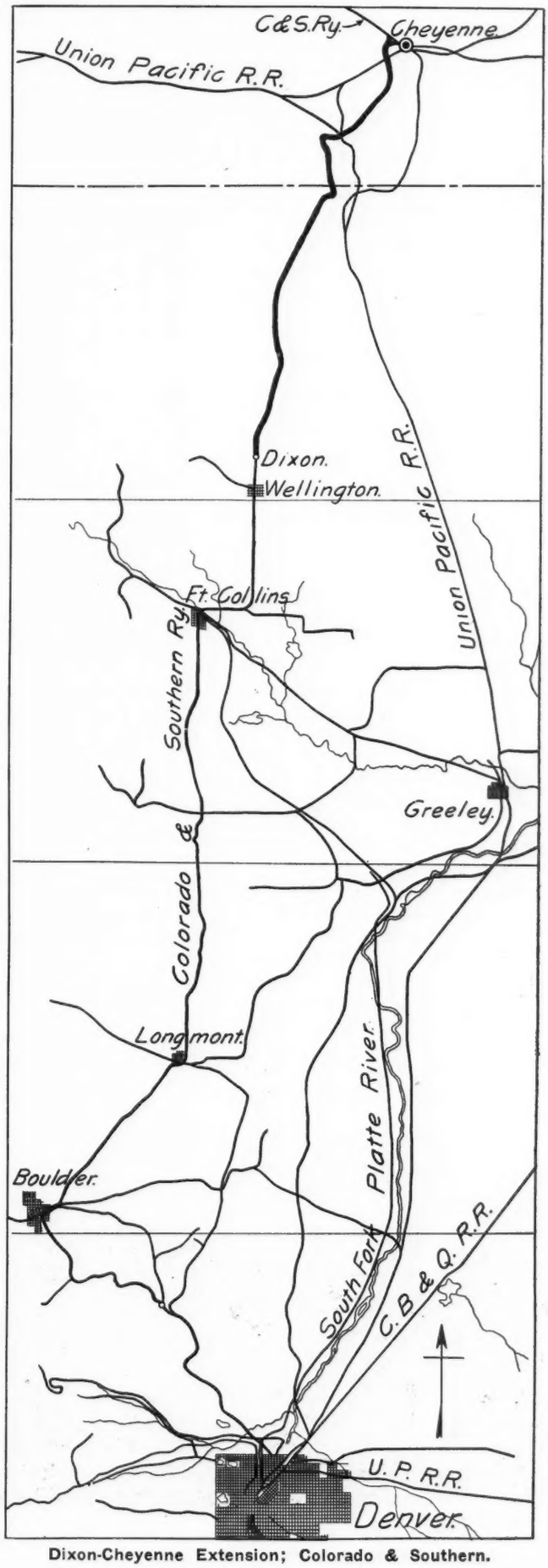
The Colorado Central was built from Denver, Colo., into Cheyenne, Wyo., about 1879, connecting with the Union Pacific main line some three miles west of Cheyenne. At about the same time the Denver Pacific was constructed from Denver to Cheyenne by way of Greeley, this being the line now operated by the Union Pacific. This line was 19 miles shorter and had easier grades than the Colorado Central line by way of Ft. Collins into Cheyenne. In 1888 the Union Pacific, owning both the Colorado Central and the Denver Pacific, took up the tracks of the former road from Ft. Collins to Cheyenne and operated entirely over the Denver Pacific.

Following the receivership of the Union Pacific in 1893, the Colorado Central was segregated from the Union Pacific, and Mr. Trumbull was appointed receiver for the Union Pacific, Denver & Gulf, which included the Colorado Central. At the time the receiver was appointed for the Union Pacific, the company also owned a line extending from Cheyenne north to Orin Junction, where it connected with the Chicago & North Western. This road was also segregated as a part of the Union Pacific, Denver & Gulf. This arrangement left Mr. Trumbull, as receiver, with a line from Cheyenne north to Orin Junction, and a line from Denver to Ft. Collins, but with no connection between Ft. Collins and Cheyenne. As receiver, he made a contract with the receiver of the Union Pacific to operate over the Union Pacific tracks from Denver to Cheyenne. This contract expired in December, 1910, and the Colorado & Southern, successor to the Union Pacific, Denver & Gulf, decided to build a line from Ft. Collins to Cheyenne, thus connecting up the two lines.

In 1902 the Colorado & Southern built an extension about 12 miles long from Ft. Collins to Dixon, Colo., and in December, 1910, a contract was let to extend this line from Dixon north 32 miles to Cheyenne. This line is now practically completed and will be put in service in a short time. The distance from Cheyenne by way of Ft. Collins and the new line is 119 miles, compared with 106 miles by way of the Union Pacific. The principal commodities that will be handled over the new line will be iron ore, coal and live stock. The iron ore comes from the Colorado Fuel & Iron Company's mine at Hartville Junction, Wyo., and the live stock, principally sheep, comes from the large ranches in Wyoming tributary to the Colorado & Southern line.

The new line rises from an elevation of 5,280 ft. at Dixon to 6,345 ft. at Athol Hill, 26 miles from Dixon, and then descends to an elevation of 6,088 ft. at Cheyenne. The maximum grade against northbound business is 1 per cent., while the grade against southbound business from Cheyenne to Athol Hill is 0.8 per cent. From Athol Hill to Dixon the grade is 0.3 per cent. against southbound traffic, the bulk of the loads moving in that direction. The maximum curvature is 2 degrees, with the exception of one 6-degree curve. All curves are spiralled and the grades are compensated for curvature. The construction of this line required the removal of about 2,700,000 cu. yds, of material, and the placing of about 12,500 yds. of concrete in bridge structures. The roadbed is 20 ft. wide on fills, except where special allowance is made for shrinkage proportionate to the height of the fill; 24 ft. wide in earth cuts and 22 ft. wide in rock cuts. Side ditches are 3½ ft. wide on top and 1½ ft. deep.

Heavy cuts and fills were necessary in three locations, and a method of payment was adopted differing from the usual procedure. The excavation or embankment within a certain territory, called an exception, was paid for at a special price per cubic yard, differing from the price mentioned in the contract for the other parts of the grading. This price covered all the work necessary to complete the excavation or embankment, or both, within the exception by any method the contractor might select. Within the limits of the exception no payment was made for



Dixon-Cheyenne Extension; Colorado & Southern.

over haul or classification of material. On one of the exceptions on mile 12 there was a cut about 2,000 ft. long, with a maximum depth of 50 ft., and a fill of about the same length averaging 40 to 45 ft. high. The largest fill handled under this arrangement was near Cheyenne; it covered a distance of over two miles, with a maximum height of 45 ft. and a maximum haul of 3 miles.

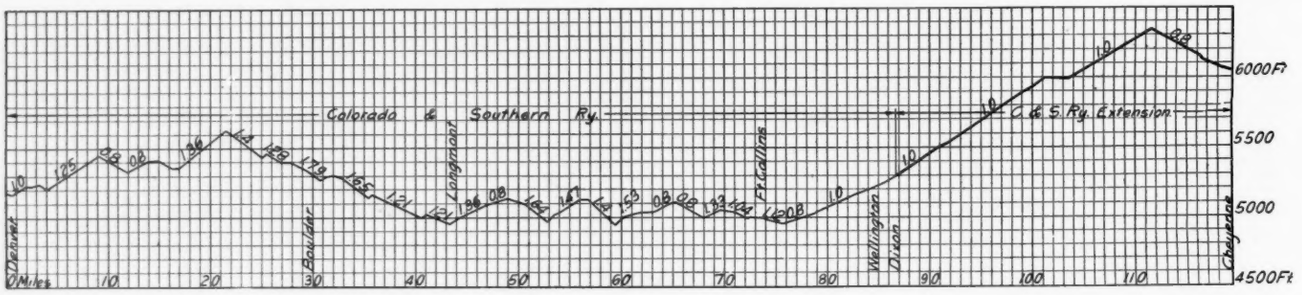
The larger part of the earth was handled with steam shovels and trains, and an average of 4 steam shovels, 15 grading machines and 500 men were employed. The large fills were made from temporary timber trestles. The openings under the track were in most cases taken care of by large cast iron pipes ranging from 24 in. to 52 in. in diameter. Provision was made for the large openings and under crossings by pile bridges. In addition to the wooden bridging, there are two 50-ft. deck spans resting on concrete abutments and piers at the crossing of Crow Creek in Cheyenne, one 126-ft. truss span on concrete abutments over the Union Pacific main line near Cheyenne, one 12-ft. arch over Clear Creek, and one 40-ft. deck girder on concrete abutments at the under crossing of the Union Pacific's Denver line at Speer. The abutments for the 126-ft. span over the Union Pacific main line are 30 ft. high from foundation to top of parapet wall, and provide a clearance of 26 ft. for the bridge above the top of the rail. One part Portland cement to eight parts sand and gravel was used in the concrete work.

Eighty-five-pound rail, with 4-hole Continuous joints and oval-headed bolts, were used. Six in. by 8 in. by 8 ft. Texas shortleaf yellow pine, treated with 8 lbs. of creosote per cubic foot, were used on plates throughout. Gravel secured from a pit on the new line near Dixon was placed under the track to a depth of 10 in. below the bottom of the ties. This ballast was loaded by steam shovel under contract, about 90 cars being loaded daily. All track was laid by hand, and the track laying gang averaged about one mile of track per day.

Three passing tracks were provided on the new line, each 2,600 ft. long, and arranged where possible as lap sidings. No. 11 frogs were used in these passing tracks. A new water supply for engines was provided by digging a well about two miles from Crouse Station, the water being piped from the well to the station through a wooden pipe line.

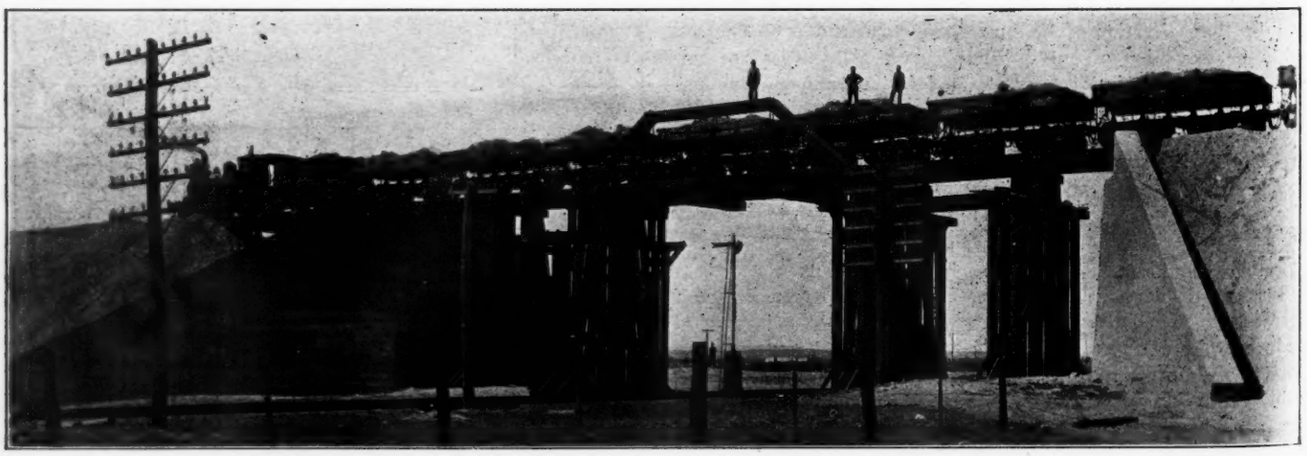
In connection with the construction of this new line, 85-lb. rail, with Continuous joints, and treated ties, were used to replace lighter material on the Wellington branch from Ft. Collins to Dixon. The banks on this line were also widened with the stripping secured from the gravel pit at Dixon.

This work has all been carried out under the direction of H. W. Cowan, chief engineer of the Colorado & Southern. D. S. Hooker was engineer in charge of construction of the new line, with headquarters at Cheyenne, with four resident engineers stationed at various points along the line. The concrete structures were designed by the company engineers. The grading was done by contract by Kilpatrick Bros., Beatrice, Neb., while the concrete was done by the Hinchman-Renton Fireproofing Co., Denver. Although the contract called for completion of the work by October 1, the work was finished in advance of this time.



Profile of Colorado & Southern Denver-Cheyenne Line.

The estimates by the minister of ways of communication for the Russian railway service in 1912 were submitted to the Imperial Council and the Imperial Duma on October 7. The receipts are put at $381,528,000, or $19,752,000 more than those for 1911. Almost the entire increase, or $19,662,000, is anticipated from the operation of the treasury railways. The expenditures are estimated at $317,800,753, or $9,318,028 more than in 1911. The greatest increase in the gross earnings is expected from the expenditure for additions and betterments of the treasury railways, namely, $6,705,845. The increase in the operating expenses of the lines is estimated at $2,888,802. On the other hand, the expenditures for the acquisition of rolling stock and accessories for the treasury railways is reduced, as compared with 1911 by $3,290,614. The net receipts from the operation of the treasury railways for 1912 are estimated at $100,455,035, or $16,543,672 more than the estimates for 1911.



Abutments at Union Pacific Main Line Undercrossing at Cheyenne.

FOREIGN CAPITAL IN AMERICAN RAILWAYS.

BY WILLIAM Z. RIPLEY,
Professor of Economics, Harvard University.

The distribution of ownership of railway securities is a matter of great public importance. It concerns a multitude of investors individually; and indirectly through the medium of beneficial corporations touches the welfare of a still greater number. As for the first class, the individual investors, it is impossible to ascertain the distribution of unregistered certificates of indebtedness; but accurate data concerning the number of shareholders has been compiled. The extravagant estimate of the late George R. Blanchard in 1897, that there were 950,000 stockholders, and 300,000 bondholders, was certainly wide of the mark. By direction of Congress in 1904, the Interstate Commerce Commission reported 327,851 as the number of shareholders of record. This figure, however, did not take account of duplications, due to ownership in several different roads by the same person, nor did it analyze with any care the holdings of trustees and banking houses. As for the magnitude of holdings by beneficial corporations, it has been estimated by competent authority, that railway securities constitute not less than one-fifth of the investments of savings banks, about one-third of those of colleges and other educational institutions, and approximately 30 per cent. of the reserves of the substantial fire and life insurance companies. Through these agencies, the number of persons indirectly interested in the welfare of the railways is greatly increased. By this same authority it was estimated that in 1905, about one-seventh of the stock and bond issues of transportation companies were thus lodged in the hands of semi-public institutions of this class.

The wide dissemination of railway securities is of interest because of its bearing upon the question of concentration of ownership or control within relatively few hands, especially as incidental to the growth of great railway systems. Scattered holdings are in this regard, a source both of strength and of weakness. Certainly a road like the Pennsylvania company with upwards of 50,000 shareholders, is too large an enterprise to be readily passed about from hand to hand. Mere size thus carries an implication of stability. In this regard, the difference between the Pennsylvania and the New York Central is significant. The latter road has only about one-fourth as many separate shareholders of record. Despite their equality in size, the ease with which the late Mr. Harriman in 1908 secured a substantial proportion of New York Central shares, could not conceivably take place on the other road. Yet on the other hand, scattered holdings in the case of smaller companies render continued control relatively easy in normal times, because of the inertia and lack of interest of the small invetsor. The greater the concentration of investment the greater is the need of actual majority ownership of stock in order to insure control. Moreover roads of a speculative sort, not on a permanent dividend basis, like the Erie the Southern Railway or the Wabash, are peculiarly exposed to centralization of control. Their securities sell for a low price, and moreover the market is always an open one. Transfer of a considerable number of shares in such roads would not attract attention, and thereby defeat the purpose of those interested in securing control.

Indications are not wanting that the general public is more alert than formerly, as to opportunities for investment in times of sudden depression. Both the panics of 1903 and of 1907 have witnessed large increases in the number of small investors. Roads like the Atchison and Union Pacific gained more than a thousand shareholders apiece within the short period of six months to August, 1903. The Pennsylvania added 15,000 new shareholders—an increment two and one-half times greater than for the four preceding years. It was not until the next period of low prices in 1907, that the number of stockholders attained so large a total gain. A goodly part of the gain in 1903-4 was from European sources, from causes shortly to be explained. The increase in the number of shareholders in 1907 was almost spectacular. The total for 25 large companies rose by upwards of 41,000 within the year—an augmentation of almost one-fifth. The Great Northern more than doubled its quota; the Southern Pacific increased by nearly one-half, and the Union Pacific by almost one-third. A peculiarity of these recent rapid expansions of railway ownership in periods of financial depression has been their permanent character. Such purchases are usually made for investment and may become a great source of financial strength to the companies concerned. And it is not unlikely that such investments in small lots by a wider, and especially a local constituency, may become a factor of some moment politically.

European capital has been of the utmost importance in the creation of the American railway net.* The dearth of funds in the early days and the phenomenally rapid growth of our transportation system rendered us peculiarly dependent upon foreign financial markets for many years. Until the panic of 1873 European investors bought our railway securities eagerly. The Illinois Central is unique perhaps in its continued interest of foreign capitalists. While many Erie bonds were held in Europe, the Illinois Central from its inception was actually controlled through its share capital from abroad; and in 1876, not less than 86 per cent. of its stock was thus held. It has been estimated that $375,000,000 of American railway stocks and bonds were held in Europe at that date. But the excesses of Jay Gould and his followers in the Erie, and the panic of 1873 put a sharp check upon investment from abroad. After the panic foreign investment gradually revived; and was not again seriously interrupted for twenty years. During this period, not only our stock exchanges, but bankers in general were peculiarly sensitive to European conditions. The Baring Brothers collapse in 1890, largely concerned with the Atchison road among American enterprises was a case in point. A chairman of the London & Westminster bank has stated at one of its annual meetings that one-third of the advance made by his institution in that year were based upon American railway securities. It is certain that a large part of the phenomenal expansion of our transportation system during the decade 1880-90 was financed abroad. As indicating the predominance of European capital at this time, the following table is significant. From this it

	Per Cent. of Foreign Stock. 1890-96	1905.
Illinois Central	65	21
Pennsylvania	52	19
Louisville & Nashville	75	7
New York, Ontario and Western	58	12
New York Central & Hudson River	37	9
Reading	52	3
Great Northern	33	2
Baltimore & Ohio	21	17
Chicago, Milwaukee & St. Paul	21	6

will appear that an absolute majority of stock in at least five large American roads was held outside the country; and of course, the bond holdings, especially in England, were even heavier in proportion, although there is no way of ascertaining their exact amount.

The acuteness of the panic of 1893 and its protracted after effects were considerably accentuated by these foreign investments in American railways. Liquidation from abroad, both of stocks and bonds assumed enormous proportions during 1893. Hundreds of millions of securities were returned to New York; at a time when we were too financially embarrassed otherwise to repurchase them. An utter collapse of prices was the result. Matters improved, however, in 1895 with the reappearance of more normal conditions; and a renewed cutflow of railway securities followed. A goodly proportion of our heavy excess of imports of merchandise over exports in that year was met by sales of large blocks of railway stocks and bonds. Many of these, however, were not permanently held, but were returned within a few months. Nevertheless their usefulness as a means

*Careful studies of European investment in America and elsewhere will be found in the following references: Journal of the Royal Statistical Society, September, 1909; Le Rentier, Paris, 1905, summarized in U. S. Consular Reports, March 23, 1905; Journal de la Société de Statistique de Paris, April, 1891; Yale Review, November, 1900; Annals American Academy of Political Science, November, 1903; World's Work, December, 1903.

of preserving the so-called balance of trade was amply demonstrated. How great was the magnitude of foreign investment, even after the liquidation of 1893-4, is shown by the following table. The total holdings of leading foreign countries in American securities of all sorts on January 1, 1899, appeared to be as follows:

England	$2,500,000,000
Holland	240,000,000
Germany	200,000,000
Switzerland	75,000,000
France	50,000,000
Rest of Europe	35,000,000

A total of over three billions of dollars appears, mainly consisting of railway stocks and bonds. German holdings, administered by Frankfort bankers at this time have been analyzed even more in detail; as is shown by the next set of figures.

ESTIMATES OF GERMAN HOLDINGS OF AMERICAN SECURITIES.

	Market Value.
Central Pacific	$12,000,000 to $15,000,000
Southern Pacific	15,000,000 17,000,000
Northern Pacific	20,000,000 25,000,000
Missouri Pacific	2,000,000 3,000,000
Union Pacific	2,000,000 3,000,000
California Pacific	3,000,000 4,000,000
Oregon Railroad and Navigation	1,000,000 2,000,000
Erie	2,000,000 3,000,000
Pennsylvania Railroad and Baltimore & Ohio Railroad	1,000,000
Louisville & Nashville	1,000,000
Chicago, Milwaukee & St. Paul	7,000,000 8,000,000
Chicago, Burlington & Quincy	2,000,000 3,000,000
Illinois Central	7,000,000 8,000,000
Rock Island	1,000,000
Denver & Rio Grande	3,000,000 4,000,000
Houston & Texas Central	2,000,000
Pittsburgh, Cincinnati, Chicago & St. Louis	2,000,000
Western New York & Pennsylvania	1,000,000
Total	105,000,000

The phenomenal outbreak of prosperity in the United States in 1898 marks a turning point both in our financial and our transportation history. Within a comparatively few years, a large proportion of our American railway securities were repurchased from abroad. So abruptly in fact was this effected in 1899-1900 that the foreign markets were all but drained dry. The trade balance with Europe was so enormously in our favor, than even by the aid of this expedient, the year 1901 began with a European credit balance in our favor of $200,000,000. Within ten years to 1906, it has been estimated that for nine roads alone not less than $250,000,000 of railway stocks were permanently returned from Europe. How profoundly this change has affected the control of leading systems is shown by the second column of percentages in our preceding table. For each of the five large companies actually controlled abroad in 1890-6, the later proportion of foreign ownership declined to less than 20 per cent.; and in some cases became almost a negligible quantity. Such railways as the Northern and Union Pacific, once largely owned abroad are now entirely domestic corporations. Only a very few, like the Chicago Great Western, are still foreign owned enterprises. The causes of this profoundly important change are several. The predominant one of course was the abounding prosperity of the United States, which so far strengthened us financially and added to our store of capital available for investment, as to render us for the time at least independent of Europe. Another reason probably was the pronounced movement toward consolidation which set in about 1899. Many railways like the Lake Shore and the Burlington were merged in larger systems, through exchange of their share capital for collateral trust bonds of the parent companies. These exchanges were offered at most attractive prices for the most part, so that European investors were tempted to part with their bond holdings. Whether as bond holders instead of share holders, they have continued their investments in this country can only be surmised. But certain movements of foreign exchange, and particularly our somewhat lessened sensitiveness to financial conditions would appear to denote an actually lessened proportional investment even in bonds and other evidences of indebtedness. One point is clear, namely that if it had not been for this opportune reduction of European interest in American railways, many of the consolidations since 1900 could never have been effected. That intimate co-operation of banking houses, insurance companies and railway managers, necessary to the prompt success of such operations would have been impossible prior to 1898.

One of the problems of American bankers of late, has been to stimulate a revival of European investment in our railway securities. The heavy participation of foreigners in the new Pennsylvania issues of 1904 was indicative of a reappearance of interest; but it was mainly confined to already well-established connections. The Harriman boom of 1906, to be sure, witnessed heavy borrowings from Europe in order to finance our speculations, but this was largely done through the creation of floating rather than permanent indebtedness.

A continuance of unfavorable trade balances appears by 1910 to be tending to bring about a recurrence of our financial dependence upon Europe. Such dependence is bound for the most part to assume the form of lodgment of American railway securities in the hands of foreign investors. Failure to interest them in our newer forms of industrial securities has impelled American bankers to turn again to the sale of railway stocks and bonds for relief. In this connection the appeal to the conservative French banking community in 1910 is worth noting. This constituency, traditionally one of the richest in Europe, as appears from our preceding table of international investments, has never been largely interested in the United States as a field for exploitation. Never entirely absorbed in its own local enterprises, it has turned mainly to Russia, Spain, Africa and the Orient for investment of its surplus funds. Conditions, as of 1899, show how ridiculously small, by contrast with its lesser neighbors—Holland and Switzerland—are French holdings of American securities. In 1902 Neymarck in *Le Rentier* estimated that the foreign interests of France aggregated about $5,790,000,000—an amount singularly equal to the national debt at that time. With upwards of four billion dollars placed in other countries of Europe, and $712,000,000 invested in Africa, all the capital lodged in all sorts of North American enterprises amounted to only about $204,000,000. This was less than half the aggregate investment in South America. Tardy recognition by our American financiers of the value of stimulating French interest has at last come. Beside the new Pennsylvania bonds and about $30,000,000 of New York, New Haven & Hartford debentures, successfully placed in Paris, little has been accomplished until 1910. But the chain of French credit banks, rather disheartened perhaps at the course of events in Russia since the Japanese war, has apparently been willing to consider the propositions of our American bankers. And the marked success of the St. Paul road in placing its Pacific coast extension bonds in Paris, is bound to find imitation. The recent placing of $7,500,000 Union Pacific 4's, and also a good sized block of Chesapeake & Ohio bonds still further accentuates the tendency. As yet this interest is mainly confined to bonds, but it is not impossible that French investors may in time learn the lesson, so thoroughly demonstrated to the British, that first class American railway shares, are more secure, and offer greater opportunities for enhancement in value with the course of time, than the bonds of second or third rate, speculative or heavily over-capitalized enterprises. With the heavy excess of our imports over exports, as compared with the period when we were enabled to buy back our railway securities held in Europe, a return to former conditions seems to promise some measure of relief. The trend for the time being at all events is in that direction.

The Public Works Committee of New South Wales has furnished its report on the proposals to construct lines from Forbes to Stockinbingal, from Parkes to Peak-hill, and from Tullamore to Tottenham. In each case recommendations were made that it was expedient that the lines should be built.

Shop Section.

REMEMBER the Paint Shop Practice competition which closes November 15. We should like to have every paint shop foreman who reads the *Railway Age Gazette,* whether he is a subscriber or not, participate in this competition. An extended announcement of it will be found in the issue of October 6, page 641. A prize of $35 will be given for the best article and one of $20 for the second best. Articles not awarded prizes but accepted for publication will be paid for at our regular rates.

JUDGING from the make-up of the committees which have been appointed to prepare reports for the 1912 convention of the American Railway Tool Foremen's Association, it will prove an even greater success than this year's convention. Reports are being prepared on the following subjects: Milling Cutters and Reamers; Care of Shop Tools; Checking Systems; Treatment of Steel, and Electric Furnaces. Tool room foremen generally should co-operate with the various committees in the preparation of their reports.

ANY one who has ever tried to keep a file of railway supply catalogs will heartily agree with Mr. Maier's communication in this issue. In 1894 the Master Car Builders' Association suggested three standard sizes for pamphlets and trade catalogs. These are: 3½ in. x 6 in.; 6 in. x 9 in. and 9 in. x 12 in. These standards have been adopted by some of the railway supply manufacturers and by the various railway associations who publish their proceedings either in pamphlet or book form. It is necessary to have a catalog file in most of the mechanical department offices of the railways, but it is very doubtful if many of them attempt to keep catalogs which are not of a convenient size; in many cases they are probably consigned to the waste basket. While the railway men will undoubtedly be greatly benefited by the use of standard sizes, the manufacturer and dealer will be benefited far more, and it is strange that they do not realize the importance of conforming to these standards.

NOWHERE are systematic and efficient methods of greater value than in the engine house. The work is so complex, and it is so important that it be handled thoroughly and yet with the least possible delay, that any method which may tend to cut out lost motion or reduce the confusion is worthy of the most careful consideration. Last month we published an article on Systematized Clerical Work at the Engine House, by Charles Maier, in which he presented certain forms or reports which, with a minimum amount of clerical work, would place a large amount of important data in such shape that it could be quickly and conveniently referred to whenever necessary. This month we are fortunate in being able to present an article by Mr. Sheafe, which describes in detail an effective arrangement for an engine house bulletin board and a simple but efficient method of handling the work reports. These methods, which were devised by H. B. Brown, master mechanic of the Illinois Central at Memphis, Tenn., are giving excellent results in the engine house at that place.

THE executive committee of the International Railway General Foremen's Association is hard at work preparing for the 1912 convention. The subject of How Shop Foremen Can Best Promote Efficiency, around which most of the discussion at the 1911 convention centered, but which even then was not exhausted, has been continued. In addition to this, reports are being prepared on Shop Supervision and Local Conditions; Shop Specialization, Work and Tools; Roundhouse Efficiency; The Relation of Tests to Shop Efficiency; The Reclaiming of Scrap, and Shop Arrangement. A determined effort is being made to get all of the reports in hand before the first of the year. This will give the executive committee an opportunity of going over them carefully and publishing them in pamphlet form, so that they will reach the members at least three months in advance of the convention, thus giving them the opportunity of carefully digesting the reports and preparing their discussions. The General Foremen's Association has done good work, but if this plan of the executive committee can be fulfilled and the members will buckle down and work hard to do their part it will do much to enlarge the scope of the association and place it where it rightfully belongs, considering the importance of the field which it covers.

WHEN the strike of the shop employees on the Southern Pacific was called the heads of the Federation had the arrogance to order out the foremen in the motive power and the car departments. The foremen at Los Angeles, Cal., refused to strike, and sent a communication to the local advisory board of the Federation in that city setting forth their reasons. We publish their statement in full on another page, with the names of those who signed it. The loyalty to the company's interest which the foremen displayed, and the spirited, clear and forceful way in which they set forth their reasons for the course they took are deserving of the warmest commendation. At the same time, the attempt made by the leaders of the Federation to cause railway officers to disregard their duty to their superior officers and the company was as deserving of condemnation as were the original demands they made on the roads, the rejection of which led to the strike. At a time when employees will strike and attempt to destroy the public service of the railways because such unreasonable demands as those the shop employees made are rejected, the roads need the greatest loyalty and the best support that their officers in all capacities can give, and the joint letter sent by the shop foremen on the Southern Pacific shows that the road has in them the kind of men who give this sort of loyalty and support. It is largely owing to the fact that the Harriman Lines and the Illinois Central have had subordinate officers in the motive power department who were able clearly to see their duty and were courageous and loyal enough to do it that the shop strike is already practically a thing of the past.

THE first prize of $35 in the competition on the Benefits Derived from Convention Attendance has been awarded to William G. Reyer, general foreman of the Nashville, Chattanooga & St. Louis, Nashville, Tenn. Mr. Reyer is also a member of the executive committee of the International Railway General Foremen's Association. The second prize of $20 was awarded to William Hall, general foreman of the Chicago & Northwestern at Escanaba, Mich., and also a member of the executive committee of the International Railway General Foremen's Association. There were eight other contestants, including C. E. Copp master painter of the Boston & Maine, Lawrence, Mass., who has served four terms as president of the Master Car and Locomotive Painters' Association, and has been very active in the work of its various committees; W. T. Gale, demonstrator, Chicago & Northwestern, Chicago, Ill., and a member of the executive committee of the International Railway General Foremen's Association; H. E. Gamble, smith shop foreman, Pennsylvania Railroad Jumata shops, Altoona, Pa., and second vice-president of the International Railroad Master Blacksmiths' Assocition; C. C. Leech, foreman of the Pennsylvania Railroad, Buffalo, N. Y.; E. J. McKernan, supervisor of tools, Atchison, Topeka & Santa Fe, Topeka, Kan., and also president of the American Railway Tool Foremen's Association; L. A. North, general foreman locomotive department, Illinois Central, Burnside shops, Chicago, Ill., and fourth vice-president of the International Railway General Foremen's Association; George H. Roberts, machine foreman, Long

Island Railroad, Morris Park, N. Y., and W. W. Scott, general foreman, Cincinnati, Hamilton & Dayton, Indianapolis, Ind., and also a member of the executive committee of the International Railway General Foremen's Association. One other contribution was received from a member of the general manager's staff on an eastern road, who does not wish to have his name used.

THE bulletin boards in engine houses and shops are supposed to be used for advising employees of important matters to which their attention should be drawn. In some cases, as where engine performance sheets are bulletined, it is expected that the information or data will spur the men to make better records. The average report or bulletin which is to be found upon these boards on many roads is so poorly printed that it is hard to see where good results can be obtained. It is not unusual to find carbon copies of reports or instructions posted, which are so indistinct as to be readable only upon the very closest inspection. In many cases mimeograph copies are used which are hardly readable. If the information is worth posting at all it should be prepared neatly and legibly, so as not only to attract the attention of the men, but to set before them an example of neatness and orderliness. How can we expect the workmen to keep their tools or work in a clean and orderly condition with such examples on the part of the management before them? A certain road is spending a large amount of money to properly develop and educate its apprentices. Great care is given in the preparation of the material in the lesson and instruction sheets, but they are printed by such cheap methods that even an editor is sometimes confused as to what is really intended, because of the poor printing. Can this be regarded as a good investment?

ONE of the competitors in the competition on Benefits Derived from Convention Attendance, closes his article with the statement that he cannot understand why we recognize the possibility for a discussion on this subject. Apparently he has not attended many conventions of the foremen, including, for instance, such associations as the General Foremen's, Tool Foremen's, Blacksmith Foremen's and Master Painters'. Foremen, who ordinarily spend all their time in the shop in which they are employed and who more than any others need the experience of visiting other shops and getting in touch with men who hold similar positions on other roads, are usually not encouraged by their superiors to attend conventions. In fact the only way that many of them ever get there is by paying all their own expenses, and, where they work on a day rate basis, losing their wages. Fortunately there are only a few cases in which this latter condition exists. Our purpose in trying to stir up a discussion on the subject was to convince the higher officials of the importance of the conventions and of their value to the railways who have representatives present. One of the most successful mechanical department executives sees to it that each of his foremen are sent once a year, at least, to visit other shops. He has a shrewd way when a foreman or shop superintendent under him puffs up and imagines that he is getting exceptional results of sending him to a larger and more important shop where he knows better work is being accomplished. The man never realizes the motive back of it, but usually comes back to his job feeling that he has still plenty of room in which to make improvements. Nothing is as helpful in spurring a man on and making him realize how much he has to learn as attendance at a good live foremen's convention.

DURING the past year the railways have found it necessary to economize as much as possible. The criticism of them by the efficiency engineers and the attention that has been attracted by the discussion on scientific management has also caused the officers and men in all departments to look more systematically into the possibilities of eliminating lost motion and to improving their efficiency. As we near the close of the year 1911 it might be profitable to stop a moment and look backward over some of the accomplishments of the year. Surely there is not a foreman who cannot point to some important improvement which has been made in his department during the year. A prize of $35 will be given for the best article received before December 15 telling of some such improvement which has been made during 1911. It is not necessary that the person who submits the article should have devised the method or scheme which is described, but wherever possible we would suggest that the author try to give full credit to the parties who are responsible for the scheme. In some cases two or three foremen may collaborate in the preparation of an article. It will, of course, be of more value if some concrete idea is given of the results which have been obtained. It may include the description of any improvement that has been made in the shops, engine houses, or repair yards, whether in the organization, in the methods of operation, the rearrangement of equipment, a new device or shop kink, the reclaiming of scrap material, or, in fact, anything which has increased the efficiency or the capacity of the department under consideration. A prize of $20 will be given for the second best article, and such other articles as may be accepted for publication will be paid for at our regular space rates.

EFFICIENT MANAGEMENT.

THE efficiency engineers who attended the meeting at the Franklin Institute, at which Wilson E. Symons presented his paper on The Practical Application of Scientific Management to Railway Operation, could not have been very wide awake or they would have criticized it far more severely. Very few efficiency engineers could agree with Mr. Symons as to his understanding of the term scientific management, for he apparently restricted it to the stop watch, time study, planning department methods, which have been used by Fred W. Taylor and others. There is undoubtedly little question in the minds of many of the efficiency engineers that conditions are such that these methods must be very greatly modified if they are ever successfully to be used in railway work. However, the betterment work on the Santa Fe, which was so severely criticized by Mr. Symons, was based on a far broader conception of scientific management and included not only a detailed study of the various operations and the application of the bonus system, but also investigations into every phase of the work of the mechanical department, including, for instance, the reduction of engine failures, increased efficiency of locomotive service, the re-claiming of scrap, and the more efficient use of materials, as well as of labor. It is a waste of time to discuss the results on the Santa Fe by means of the figures shown in the annual reports, without thoroughly studying all of the conditions on the road during the time that the figures cover. There is a question as to whether any very important gains were made, and many consider that there was a real loss.

One thing, however, must not be lost sight of, and that is that the work on the Santa Fe did much to stir up the mechanical department officers of most of the roads in this country to studying the principles of efficiency. There were many good things in the betterment work. Hundreds of representatives from other roads visited the Santa Fe and went back home and made recommendations as to how certain features might be applied to advantage to their conditions. Whether the Santa Fe lost or gained by the application of the betterment methods there can be no question but what it spurred other roads on to make improvements, the result of which it is impossible to estimate.

Considerable discussion was caused some time ago by data, which was collected by the Interstate Commerce Commission, showing the cost of turning tires in different railway shops. In discussing Mr. Symon's paper Mr. Milner directed attention to the fact that such comparative cost data does not mean much unless it is accompanied by a careful statement of the conditions under which the work is done in each of the shops. He brought out the fact that the labor cost of such operations involves and

is dependent on the volume and regularity of the work which is to be done; the facilities for doing it, including the tool equipment, appliances, etc.; the local wage scale; the class of labor used; the amount of assistance given to the workman in charge, and other conditions under which the operation is performed.

MECHANICAL ARTICLES DURING OCTOBER.

ARTICLES of special interest to our mechanical department readers that have appeared in the weekly issues of the *Railway Age Gazette* since that of October 6, and to which Shop Section readers may wish to refer, are as follows:

Electric Railway Convention. The American Electric Railway Association met at Atlantic City, October 10 to 13. Questions which were discussed, and which are of interest to mechanical department men on steam roads, were, the cost of unloading coal and delivering it to the boiler at stationary plants; the frictional resistance of center plates; the removing of wheels from axles and the mileage of wheels; the education of apprentices; and, standard couplers for interurban service. October 13, page 715.

Electric Lamp Testing Device. A device used on the Western Railway of France for giving electric lamps repeated shocks to test the strength of the metallic filament. October 20, page 774.

Car Heating by Air Pump Exhaust Steam. Description of a device which allows the exhaust steam to be used for heating purposes. It automatically prevents the back pressure in the pump from becoming excessive. October 20, page 776.

A New Journal Box. Description of a box which is practically dust proof and has a new type of cover and dust guard and also an attachment for controlling the lateral motion. October 20, page 777.

The Arrogance of Grand Chief Stone. A secret communication was sent to the members of the Brotherhood of Locomotive Engineers who hold official positions, such as traveling engineers, road foremen of engines, etc., in which they were instructed to perform their usual duties but under no circumstances to take the place or do the work of the strikers. October 27, page 827.

Locomotive Efficiency and Condition Reports. Article by N. D. Ballantine, superintendent of car service, Rock Island Lines, outlining in detail a method for checking the locomotive efficiency and condition by which it should be possible to greatly improve the efficiency of locomotive operation. October 27, page 830.

Swedish Steel. Extract of a paper presented before the New York Railroad Club by A. R. Roy, in which the reasons for the superiority of the Swedish steel are discussed. October 27, page 837.

Improved Smoke Chart. M. E. Wells, assistant master mechanic, Wheeling & Lake Erie, has devised a smoke chart which makes it possible to easily and quickly make locomotive smoke observations and with more accurate results than can be obtained with a Ringleman chart. The way in which the smoke prevention problem is being handled in Cleveland is also described. October 27, page 838.

Automatic Car and Air Coupler. Description of a device which automatically connects both the draw bars and air connections of two cars, and which has been extensively adopted by the Interborough Rapid Transit Company of New York. October 27, page 847.

NEW BOOKS.

Proceedings of the International Railway General Foremen's Association. 125 pages, exclusive of advertising; 6 in. x 9 in. Paper bound. Secretary, L. H. Bryan, Two Harbors, Minn.

The secretary is to be congratulated on the short time which has elapsed between the 6th annual convention, which was held in Chicago the latter part of July, and the publication of the proceedings. The entire time of the convention was given over to the presentation and discussion of a report on How Can Shop Foremen Best Promote Efficiency and the proceedings should be studied by every shop foreman. On account of the convention will be found in the *Railway Age Gazette* of August 4, 1911.

Proceedings of the American Railway Tool Foremen's Association. 108 pages, exclusive of advertising; 6 in. x 9 in. Paper bound. Secretary, M. H. Bray, N. Y. N. H. & H., New Haven, Conn.

Mr. Bray has made a splendid job in getting the proceedings of the third annual convention out so promptly and in a specially neat and attractive form. The most important papers which were presented were, The Equipment of the Railway Tool Room; The Economical Use and Care of Grinding Wheels; Standardization of Steel; Pneumatic Tools and Appliances; The Use of Templets, and Dies for Forging Machines. An account of the convention appeared in the *Railway Age Gazette* of August 4, 1911.

Letters to the Editor.

A LITTLE MORE ON THE SCRAP PROPOSITION.

BUFFALO, N. Y., September 15, 1911.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

The articles on the reclaiming of scrap material, published in the September Shop Number, were very interesting, some of the results obtained being truly astonishing. The magnitude of the saving to a great system, as described by Mr. Burkhard, had not been thought possible. It is an important and refreshing sample of conservation. We like his way of putting it: "Disposition of everything is made at the scrap platform. It is either *scrap*, or it is *good*." That is the keynote of the problem! We have an iron rack, similar to the one he described, which was constructed entirely of old car sills and round iron rods. It presents a neat appearance and is fully as good as if made of new material. It accommodates sixty varieties of iron and occupies a ground space of 18 ft. x 12 ft.

It is surprising that more papers were not submitted on this subject, which is so full of great possibilities. Perhaps few have any systematic plan for utilizing scrap material, without which the saving is lost in the extra time and labor required. Often when certain kinds of scrap are reported on monthly storehouse lists to be disposed of and the amount reported is for some reason greater than the immediate supply, good material, that would otherwise be reclaimed, is allowed to go into the scrap in order to fill out the desired quantity.

On one occasion an officer at a large division shop would not allow any small pieces of iron to be kept at the iron rack because they spoiled its general appearance; consequently much good iron, in lengths varying from 1 to 2 ft., found its way to the scrap bin. Blacksmiths and iron workers are usually very glad to get hold of short pieces for small jobs, especially where the piece-work system is in operation, as much time is saved by not having to carry in and cut off a long bar. While we would not advocate turning the iron rack and its surroundings into a small edition of the scrap yard, it is certainly advisable, and in the interests of economy, to discriminate in favor of the short pieces and not arbitrarily send all to the scrap.

There are some shops that have a system of handling material whereby if it remains unused or uncalled for, or if a certain percentage of it is not used in a fixed time, it must be eliminated from the stock, either by sending it to other division points where there may be a call for it, which is not often the case, or by consigning it to the scrap. The latter expedient is probably more often resorted to. Often this material is wanted soon after it is disposed of and has to be ordered to fill immediate demands.

Mr. Wolfgang strikes the target square in the centre when he says: "The foreman should know to what series of cars the castings and forgings belong and should have the good scrap sorted out and properly distributed. There will probably be considerable scrap from foreign roads. This should be sorted and all the castings and forgings of the same class should be kept together." An enterprising car repair foreman instituted a small scrap yard and shed on his own account for the care of all good scrap material, especially that of foreign cars, at a convenient point in the repair yard. The result was that repairs were expedited and a foreign car was seldom delayed because of waiting for repair parts. Under our modern system of storeroom accounting and methods of handling and reclaiming scrap material it would be easy to demonstrate the immense saving to the company that undoubtedly resulted from this man's enterprise and foresight.

Mr. Snyder mentions a specially good point—a supervising committee that visits the scrap yard once a week and sorts out and recommends certain material for use. This is more than ever along the line of efficiency, and has been adopted to a certain extent at other shops.

In his explanation of the reclaiming of paint residuum, Mr.

Sheafe gives us something really startling. Who would think that those old paint cans we so often see decorating a pile of tin scrap held such valuable possibilities, and that when submitted to proper treatment and their contents combined with raw oil could be coaxed to give a saving of 39½ cents a gallon over the cost of new paint—and have a much better article at that. These articles have brought out a great many valuable suggestions and methods and should be the means of great saving if put in practice either entire or in part.

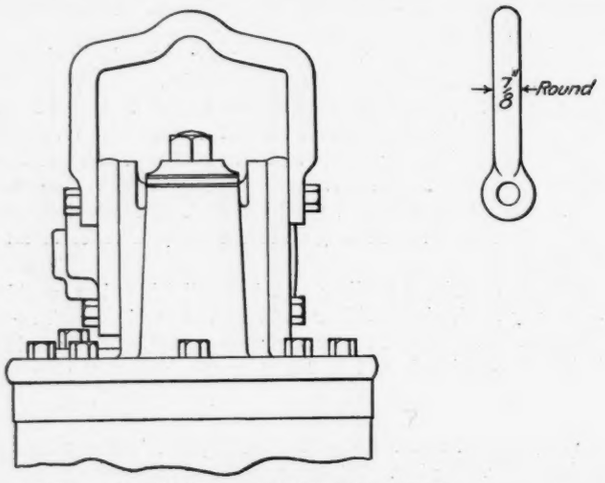
C. C. LEECH,
Foreman, Pennsylvania Railroad.

YOKE FOR LIFTING AIR PUMPS.

Corbin, Ky., October 10, 1911.

To the Editor of the Railway Age Gazette:

In reading over the description of the yoke for lifting air pumps, in your October 6 issue, I thought you might be interested in a yoke we use for the same purpose. It is made of ⅞-in. round iron, which is flattened at the ends for the bolt



Yoke for Lifting Air Pumps.

holes and is bent at the top to receive the hoisting hook. It is attached to the upper front main valve cylinder head bolts, the nuts being left loose so as to relieve any strain while lifting. The weight is well balanced and the device has given splendid results.

J. A. JESSON,
Louisville & Nashville.

TRADE CATALOGS.

Atlantic City, N. J., October 13, 1911.

To the Editor of the Railway Age Gazette:

There is one part of the railway supply business that is open to improvement, and when the improvement is made both the buyer and seller will be benefited. When a new machine or tool is needed, unless there is some special reason for getting a particular make, it is generally necessary to study over the various catalogs. Or, on the other hand, a catalog may suggest the necessity of a tool. However, to cover the field of railway shop tools and supplies properly a large number of catalogs and descriptive pamphlets must be kept on hand. As now issued each concern seems to aim to have a size of its own and anyone that has tried to keep a file of catalogs realizes what an inconvenience it is. To illustrate: We have 175 catalogs and pamphlets on file ranging in size from 3 in. x 4½ in. to 10½ x 13¼ in. There are 40 different sizes, and only 67 of the catalogs are of the M. C. B. standard sizes. I suppose it would be impossible to get the various railway supply concerns to get together and agree on certain uniform sizes for their catalogs and pamphlets. However, if the various associations of railway officers adopted the M. C. B. standard sizes of catalogs and then requested the members to refuse to keep on file any catalog that was not a standard size, it would probably have the desired effect. By allowing a suitable length of time to pass before this was put into effect, there would be no injustice done to anyone, and in the end all would be benefited.

CHAS. MAIER,
Engine House Foreman, West Jersey & Seashore.

BENEFITS DERIVED FROM THE GENERAL FOREMEN'S CONVENTION.*

BY WM. G. REYER,†
General Foreman, Nashville, Chattanooga & St. Louis, Nashville, Tenn.

In the Spring of 1909 a supplyman visited our shops and inquired if I expected to attend the General Foremen's convention at Chicago in June. He was a good talker and soon proved to me that it would be to the company's interest, as well as my own, to attend. The management of the road kindly allowed me to go. That convention was an eye-opener to me; it was a great privilege to get in touch with other men's ideas and methods, some of which proved a great help to me. I thought that I would like to tell them of some of the things we were doing in our shops, but after hearing what they had to say, I felt so insignificant that I would have liked to have crawled off into a hole. It set me to thinking, for I felt that I was a back number.

I confess that I came away from the convention with a determination to wake up and see if I could not get the same results that the other foremen were getting, and during the next year I made some changes which helped in the output. Our next convention was held in Cincinnati; I was a good listener and noted what the others had to say. One speaker in particular explained how he handled his department and the number of engines it turned out monthly. At the time it seemed impossible to me, and I arose and said: "I'm from Missouri; you will have to show me." His answer was: "Come up and see me and I will take pleasure in doing so." I went and found conditions just as he had explained; he certainly was pushing things. I made notes of such improvements as would benefit our shops.

On my way home I stopped at another thoroughly up-to-date railway shop and gained additional information. I saw so many good things that I hardly knew where to start taking notes. I worked early and late and it was a splendid schooling for me. On my return home I reported what I had seen to my superintendent and asked to be allowed another and more extended trip. which was cheerfully granted. This eagerness to see and ambition to learn of the improvements of others was the result of attending the General Foremen's conventions. I am sure that if other general foremen could personally see and know of the important changes I have made, they would not hesitate, but would be eager to attend the next convention, and it will surely wake them up.

At our last convention the subjects discussed were of interest to all foremen, and I not only listened, but had something to say. I was anxious to have the large assembly know of the benefits I had derived from the former meetings and of the improvements I had made, which had resulted in a large increase in shop output. A good friend of mine, a supplyman, overheard a conversation between two foremen, who seemed to doubt my figures. He entered into the conversation and told them that the figures were correct, as he had recently visited our shops and that "seeing was believing."

I am sure that anyone who attends the conventions and takes the proper interest cannot fail to be greatly benefited. He must be in the convention hall on time, listen attentively to what is said, make notes, and after the meetings take in the exhibits. I find there are many valuable points to be had from the supplymen, and they are given willingly and cheerfully. Of course we all enjoy the social side of the conventions, but we should not neglect the business side, and must keep in mind that business comes before pleasure.

*Awarded the first prize of $35 in the competition which closed October 15, 1911.

†Mr. Reyer is a member of the executive committee of the International Railway General Foremen's Association.

I have been benefited by attending the conventions in the following ways: The handling and treatment of men; the different ways of doing machine work; how to handle engines at terminals; and by the addresses we have the pleasure of listening to. We have increased our output about 33⅓ per cent.

These are the things that make a man think, and when you get men to think you are sure to get results. I firmly believe that if every railway in the country would send representatives to the different conventions and demand written reports from them, they would soon see the benefit. A foreman may make a statement before the convention that he can do a certain piece of work in a given time; you may find that he is doing better than you are, and my plan is to ask just how he handles the work. If you get into conversation with him afterward and keep drawing him out, you will often be well paid. There are many men who are backward on the floor, but who have splendid ideas and ways of doing things. I only wish that there had been a General Foremen's convention twenty years ago, and hope this may lead some who have not as yet attended a convention to go to the next one.

EFFICIENT ENGINE HOUSE METHODS.

BY J. S. SHEAFE,

Engineer of Tests, Illinois Central.

Engine house work is so complex and so much depends on its being handled promptly that to secure the greatest efficiency it is necessary to thoroughly systematize and simplify the methods

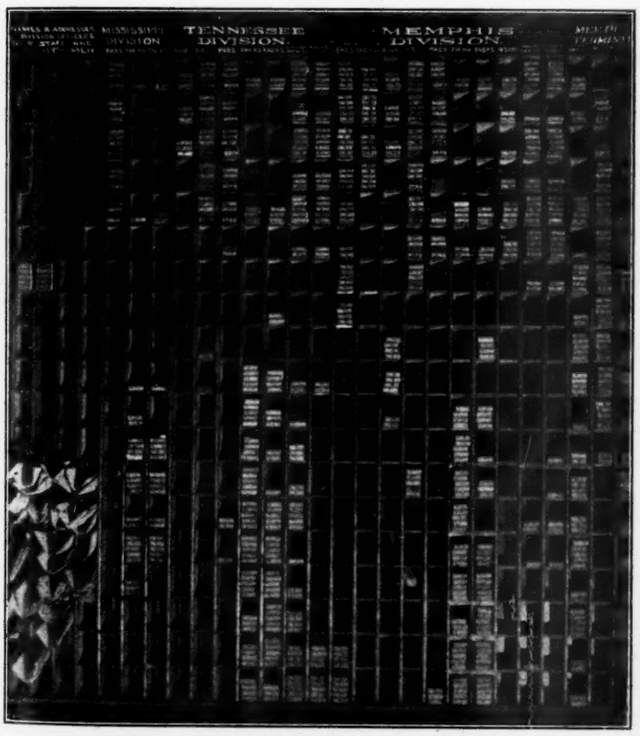


Fig. 1—Engine House Bulletin Board.

which are used. H. B. Brown, master mechanic of the Illinois Central at Memphis, Tenn., has perfected a simple and effective system which differs greatly from the methods ordinarily used. It has resulted in a great saving of time, the easy placing of responsibility and has also eliminated a certain amount of confusion which is found in the average engine house.

Bulletin Board.—The first step was to replace the ordinary bulletin board, whose chalk marks are not always legible, by a rack arranged to show the same and considerable additional information in a clear and comprehensive manner. A general view of this bulletin board, or rack, is shown in Fig. 1, and a small portion of it is shown in detail in Fig. 2. The rack is about 6

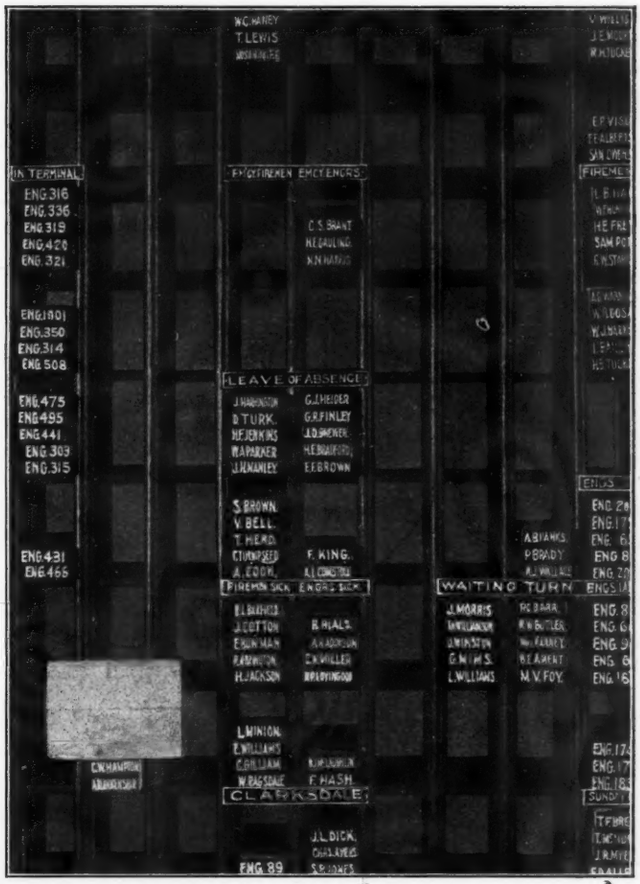


Fig. 2—Partial View of the Bulletin Board.

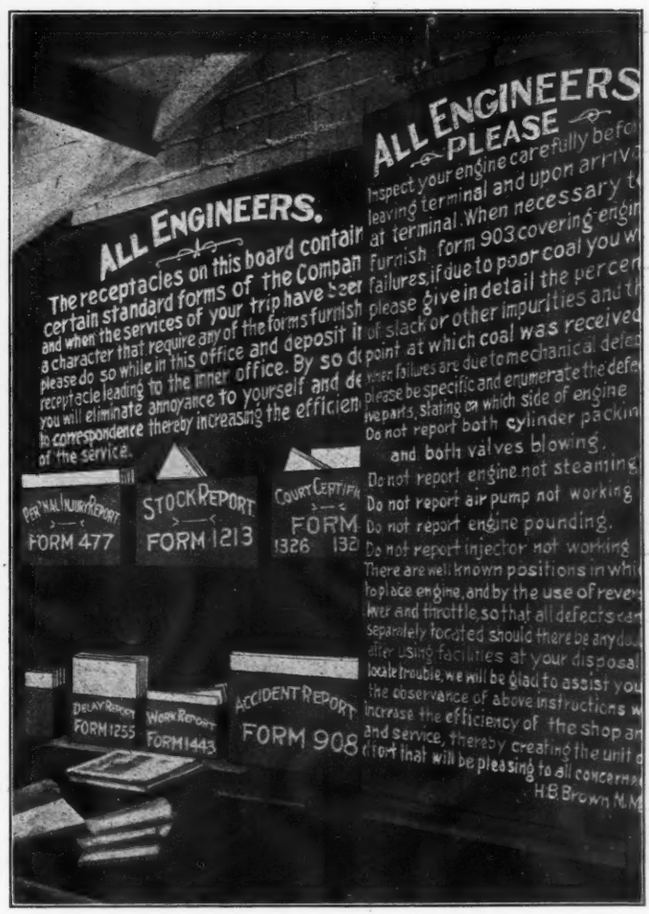


Fig. 3—A Corner of the Engineers' Room in the Engine House.

ft. high and 4 ft. wide, and takes the place of a portion of the wall between the foreman's office and the outer room. It is fitted against a large plate glass which prevents any tampering from the outside. The engine numbers, run numbers, times and the names of the engineers and fireman are placed on the ends of ¼ in. x 1½ in. x 4 in. blocks as shown, the same information appearing on both ends. On the sides of the engineers' and firemen's blocks are shown their addresses, phone numbers, promotions, discipline, etc. In the same way data for each engine is shown on the body of the block containing its number. The rack is divided into different divisions or districts, and each of these is subdivided into sections to show the names of the engineers on the road, engineers waiting turn, engineers off duty, extra engineers, and engineers in the terminal; similar subdivisions are provided for the firemen.

In making up a train the foreman places the blocks in the proper pigeon hole in the subdivision of the rack for the district upon which the run is to be made, showing the train number, time, engine, engineer and fireman. The board can, of course, be read from either side, and it is interesting to watch the smooth and quiet way in which it is operated. Other important advantages are its orderliness and cleanliness. The enginemen can easily note their calls, and after consulting the post office pass on without confusion. Twenty-six pigeon holes at the lower left-hand corner of the board are marked with the letters of the alphabet, and are used as a post office.

Engineers' Report Desk.—The arrangement of the desk in the engineers' room is worthy of notice, and is shown in Fig. 3. Here may be found all of the standard forms which are required for reporting a trip, and also instructions for making out the work reports. Mr. Brown believes in constantly reminding the engineers that it is important that the work should be properly reported and that they should accurately locate the trouble and not leave it to be determined by a hurried engine house force. With this in mind he has had a number of "reminders" neatly printed and prominently posted, so that they will be read and followed. The engineer after making out his work report on an individual sheet folds it and drops it through a slot in the partition; it is deposited on a desk in a part of the foreman's office which is used for the handling of work reports and is in charge of a clerk.

Work Reports.—The engineer's report is dropped through a slot, which is shown at the right in Fig. 4. The clerk classifies the work, using separate slips for each job and drops them into the proper slots at his left. When no work is reported, an O. K.

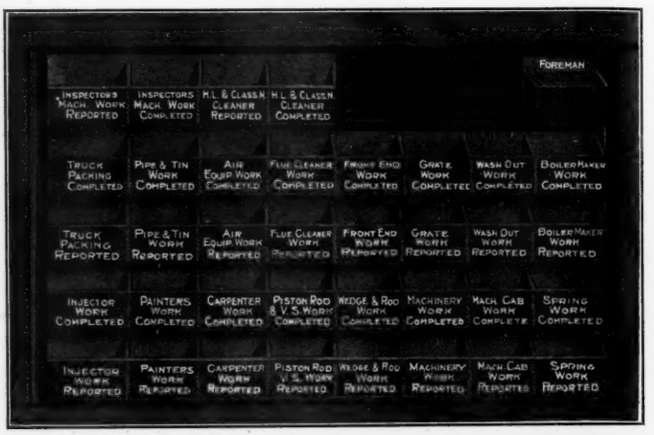


Fig. 5—Rack for Distribution of Engine House Work Reports.

slip is handled in the same manner. At the extreme left in the illustration is a rack in which a space is provided for each engine. The work reports are filed in this case and are held for a time, after which they are filed for permanent record. The boxes into which the work slips fall, after they are dropped into the slots, are shown in Fig. 5. They are so arranged that the man in charge of each class of work can readily get the work slips and see just what work is to be done on each of the engines in the house. When the work is completed the slips are promptly

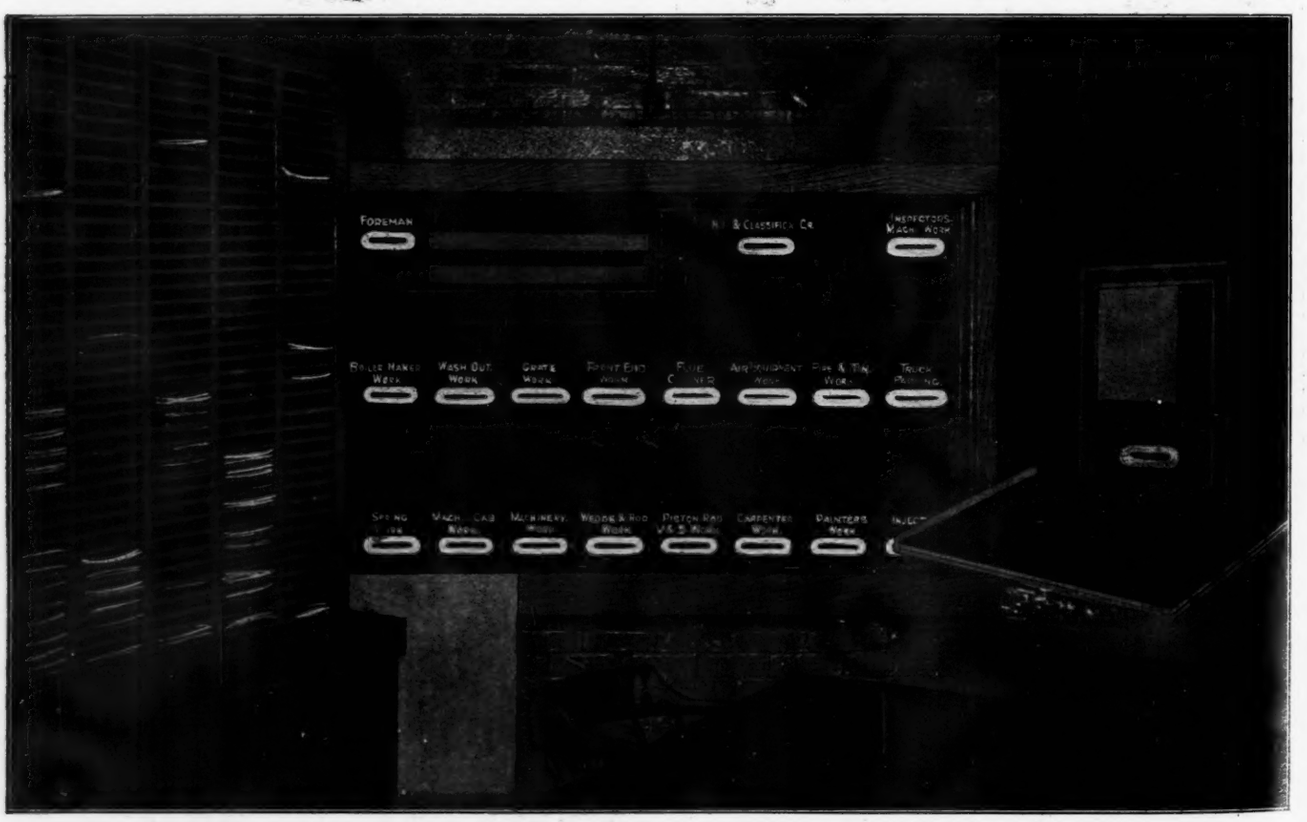


Fig. 4—Office Where Work Reports Are Handled.

signed and slipped back through a slot into the office, where they are recorded.

To the right of the boxes, which are shown in Fig. 5, is a blackboard, Fig. 6, which shows at a glance the progress of the work on all engines, the location of the engines, etc. The following symbols are used in recording information on this board:

O means no work reported.
/ means work underway.
X means work completed.

For instance, engine 701 is on pit 6 and came in at 5.05. No work was reported on the front end or air equipment. The

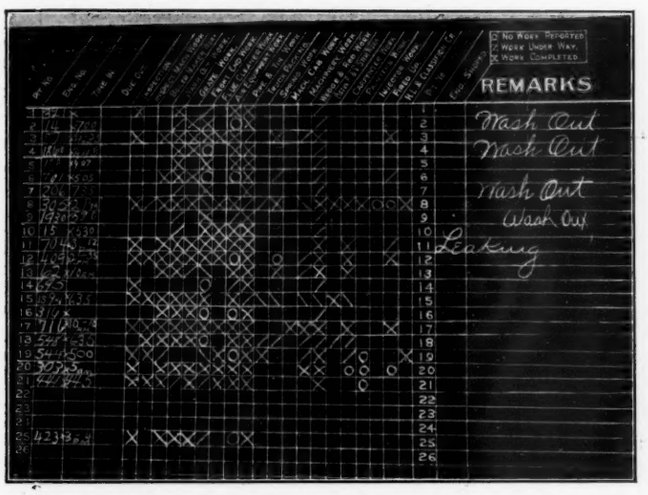


Fig. 6—Bulletin Board Showing the Condition of All Engines in the Engine House.

spring work, wedge and rod work are under way and the locomotive is also being fired up.

Since the installation of this system at Memphis there is less confusion and no difficulty has been found in quickly locating any information which may be required. Not only has it met with the approval of the officers, but the men also like it. The initial cost of the equipment is trifling as compared with the benefits which have resulted from its use.

BENEFITS DERIVED FROM THE GENERAL FOREMEN'S CONVENTION.*

BY L. A. NORTH,†

General Foreman Locomotive Department, Illinois Central, Burnside Shops, Chicago, Ill.

In the first place, a great deal of practical knowledge may be obtained by the interchange of ideas with the men with whom you come in contact at a meeting of this kind, where a large number of roads are represented. Few men have the same opinions or the same methods of handling either labor or material. Difficulties can be talked over and remedies suggested for the various troubles that are a part of any shop organization. Good is bound to come from this interchange of ideas.

Where men are pinned down to one shop day in and day out, unless they are very progressive and ambitious, it has a tendency to make them get in a rut. In order to handle the work properly and keep the expense down as low as possible, or in other words get the best results for the money expended, it is necessary for them to know of the latest, most modern and most up-to-date methods. While the mechanical papers are a great benefit, I believe that with the aid of the conventions there is a stronger tendency to improve the capacity and to broaden the ideas of the members. The exhibits offer an excellent opportunity to learn of the improvements in tool equipment, which are demonstrated by the actual machine. With the machine in operation the men are better able to judge what class of work it is best adapted for in their shops. It also has a tendency to suggest ways in which old machines may be changed to handle the work to a better advantage. Working models of various devices also demonstrate their operation and advantages more clearly than is possible by any catalog or printed matter.

*Entered in the competition which closed October 15, 1911.
†Mr. North is fourth vice-president of the International Railway General Foremen's Association.

THE BRICK ARCH AND THE MALLET LOCOMOTIVE.

In August and September, 1910, an extensive series of tests was made on the New York Central & Hudson River of a 2-6-6-2 type superheater Mallet locomotive equipped both with and without a fire brick arch. The locomotive, which was described in the *Railway Age Gazette* of April 1, 1910, page 889, has 57 in. drivers, 20½ in. and 33 in. x 32 in. cylinders and carries 210 lbs. boiler pressure. It has a total heating surface, including the superheater, of 3,953.7 sq. ft., and a grate area of 56.5 sq. ft.

The tests were made between Tobert, Pa., and Stokesdale Junction, a distance of 59.83 miles and were confined to the north bound movement. There is an ascending grade, with the exception of 4½ miles of level track distributed over six places, and 1.19 miles of descending grade, which occurs at two points. The tests were operated under the personal direction of a committee of three, composed of one representative each from the New York Central & Hudson River, Pennsylvania Railroad, and the American Locomotive Company.

Conclusion No. 5 in the committee's report reads as follows: "The data in reference to the performance of the boiler with and without fire brick warrants the conclusion that the application of fire brick to this type of locomotive, using this grade of fuel, might be expected to result in a saving of about 11 per cent. Against this it should be borne in mind that the superheater flues must be blown out at regular intervals and that the brick arch interferes to some extent with this operation. Also, that boiler repairs to all tubes are to some extent interfered with by the brick arch." These objections, however, are not at all serious, for with the Security type of brick arch, which was used, it is a comparatively simple matter to remove and replace any part of the arch in order to work on the ends of the flues or the flue sheet.

Six tests were made with the brick arch in place, an average of 25,595-ton miles being obtained per ton of coal. In five tests without the brick arch an average of 21,899-ton miles were obtained per ton of coal, or, in other words, there was an increase of 16.8 per cent. in ton miles per ton of coal due to the installation of the brick arch. This percentage should have been somewhat greater, because in the test without the brick arch the two arch tubes were in place, thus adding to the heating surface of the boiler and improving the circulation.

The average equivalent evaporation per pound of dry coal for the six tests with the brick arch was 9.65 as compared to 8.47 for the five tests without the brick arch. The installation of the brick arch, therefore, resulted in an improvement of 13.9 per cent. in this respect. The average thermal efficiency without the brick arch was 58.56 per cent., as compared to 67.66 per cent. with the brick arch, an increase in efficiency due to the brick arch of about 15.5 per cent. The greater percentage of increase of the thermal efficiency as compared with the equivalent evaporation per pound of dry coal is doubtless due to the fact that the brick arch is responsible for a higher degree of superheat.

The electrical power developed at Niagara Falls, according to a paper read before the American Electrochemical Society by A. J. Jones, is estimated at 275,000 h. p., or about 5.5 per cent. of the available power of the cataract. The seven hydro-electro stations furnish 128,000 h. p. for hydrochemical purposes; 56,000 h. p. for railway service; 36,000 h. p. for lighting and 55,000 h. p. for various industrial purposes.

CARE OF BELTS.

BY C. J. MORRISON.*

One of the large items of expense in a shop receives, as a rule, very little attention and that attention is usually given by an unskilled laborer. This item is the belting. The expense is caused not only by the outlay for belting and supplies, but also by the delays caused by belt failures. It is a common sight in many shops to see high priced mechanics standing idle waiting for a belt to be repaired. As any waste is contrary to the principles of effective organization it is essential that the belting be given proper attention. One of the first requirements is to secure the best quality of belting. A few years ago it was necessary to purchase belting according to rigid specifications, but the manufacturers have recently adopted standard specifications, and belting of the best brand, made by any of the reputable manufac-

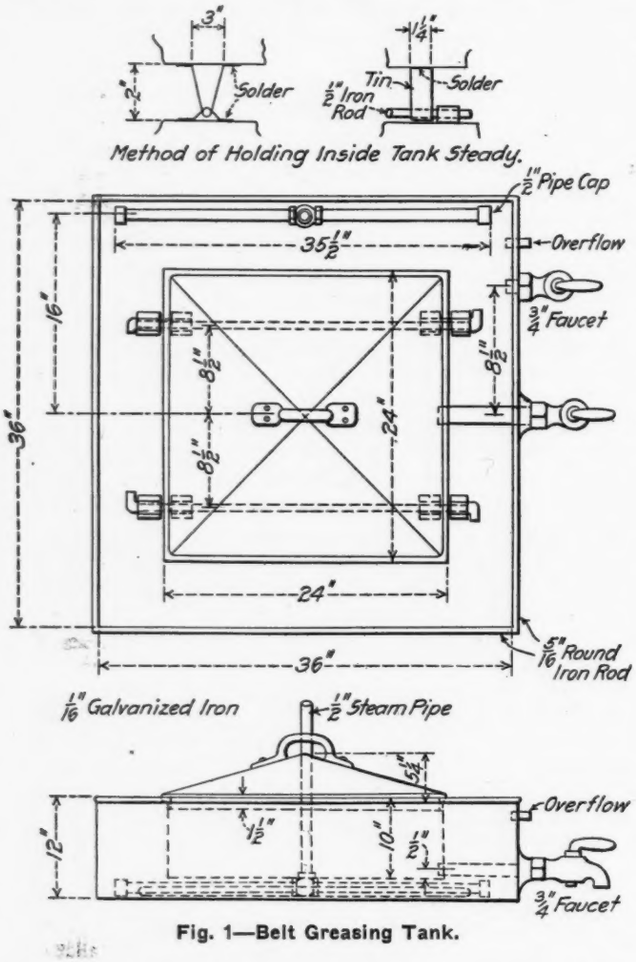


Fig. 1—Belt Greasing Tank.

turers, may be depended upon. Under no circumstances should a riveted belt be used. Exhaustive tests have proved that the rivet holes simply weaken the belt. Rivets may therefore be taken as a sign of poor belting.

BELT REPAIR EQUIPMENT.

The following methods apply to shops having between 1,000 and 3,000 belts. For other conditions the plans will have to be modified. There should be a regular belt repair room, fitted up with a complete outfit for caring for and repairing belts. This room should be about 13 ft. x 50 ft., centrally located, well lighted and locked at all times to prevent the belting from being stolen. The width of the room may vary considerably, but the length is important as it is necessary to be able to stretch out the belts. At one corner of the room a rack 3 ft. wide and 6 ft. high should be built for storing second-hand belting after it is repaired. A regular work bench 18 in. x 33 ft. should run along the side of the room which has the better light. Opposite this table, about 10 ft. from the belt rack and 6 ft. from the table a belt lacing machine should be located. Just back of the machine, and within easy reach of the operator, should be placed a rack with six spaces for the wire and twelve boxes for the needles. Each space for wire should be partitioned into two divisions; one for right hand coiled and one for left hand coiled wire. On the far

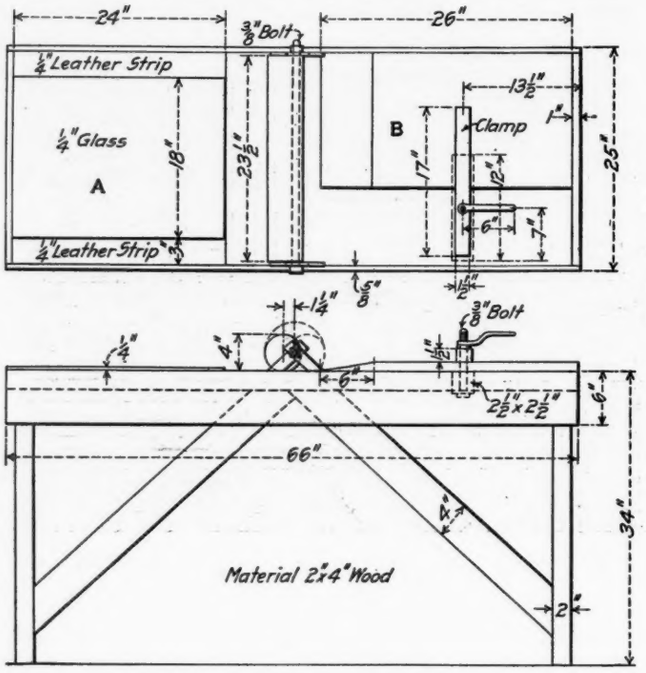


Fig. 2—Belt Repair Bench.

end of the bench a heavy letter press should be fastened, and just beyond the bench, on supports to bring it up to the height of the bench, should be located a double tank for the belt dressing and for heating the glue, Fig. 1. This tank should be connected with a steam line for heating the water. At the far end of the room the gasoline tank for cleaning the belts should be placed. Opposite the press and about in the center of the room a belt repair table, 2 ft. x 5½ ft., Fig. 2, should be placed. A rack, 16 in. x 7 ft., for holding inserts or take-up pieces should

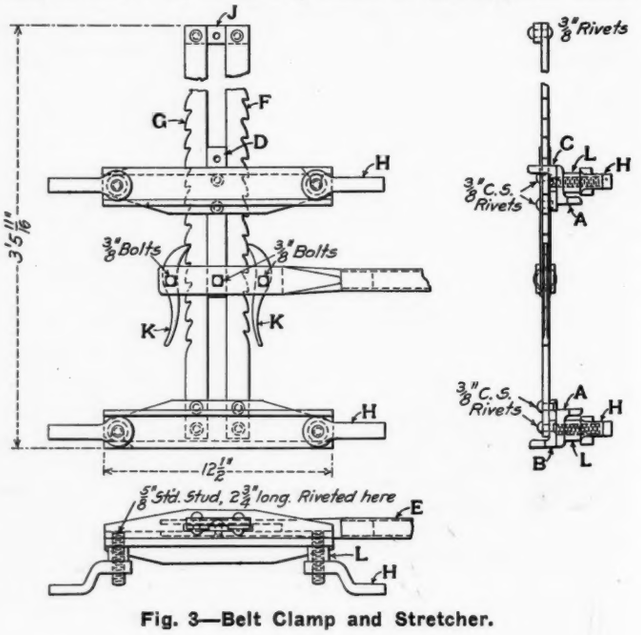


Fig. 3—Belt Clamp and Stretcher.

*Manager Department of Effective Organization, Suffern & Son, New York.

stand near the door. This rack should be divided into pigeon holes 1 in., 2 in., 3 in., 4 in., 5 in., and 6 in. deep respectively, and 1½ in. to 8 in. wide to hold the different size inserts. The remaining spaces along the sides of the room may be used for storing clamps and tools and belts waiting for repairs. Following is a complete list of the necessary tools:

1—12-in. Jackson belt lacing-machine.
6—Boxes of each size of wire.
1000—Rawhide pins, assorted sizes, Nos. 3, 4, 5, and 6. Use nothing else in lace.
6—Doz. of each size of needle.
2—No. 3 Bailey smoothing planers, 1¾-in. cutter.
1—Half moon harness knife.
1—Carpenters' marking gage.
1—One hundred ft. steel tape.
2—Pair Bernards 6-in. cutting pliers.
3—Pair 5-in. flat nose pliers. These pliers are used for turning under the ends of the wire.
1—Oil stone, 1 in. x 2 in. x 8 in.
2—7-in. carpenter's try squares.
1—14-in. carpenter's try squares.
3—Three cornered belt scrapers (Home made).
3—Flat cornered belt scrapers (Home made).
2—Hand belt punchers, 3/32-in. tube.
2—Sets Kerr's belt lacing outfit.
6—Boxes Kerr's metallic lacing outfit, No. 1.
6—Boxes Kerr's metallic lacing outfit, No. 2.
6—Boxes Kerr's metallic lacing outfit, No. 0.
2—6-in. scratch alls.
1—Large book press, 18 in. x 24 in.
12—14-in. hand clamps.
6—6-in. hand clamps.
1—Gal. glue bucket. Double-water outside and glue inside.
3—Sets of clamps and rods for pulling on belts. 10-in., 16-in., 24-in.
1—Gasoline tank, 3 ft. x 3 ft. x 1 ft.
1—Hot water tank, 3 ft. x 3 ft. x 1 ft.
1—Oil tank, 2 ft. x 2 ft. x 10 in. (To set inside water tank.)
1—Dietz inspector's lantern.
2—12-in. monkey wrenches.
2—14-in. alligator wrenches.
3—Wood straight edges. 3 ft., 6 ft. and 12 in. long x 3 in. wide and ½-in. thick.
1—Belt bench,* 5 ft. x 2 ft. 8 in. (Fig. 2.)
1—Wheelbarrow.
3—Oval punches, No. 10.
1—Shoe maker's hammer.
2—Belt stretchers,† one 5-in. and one 10-in. (Figs. 3 and 4.)
6—Belt clamps for holding splices, two 4-in., two 7-in., two 10-in. (Fig. 5.)

Belt Dressing.—The belt dressing should contain equal parts by weight of a good quality of fish oil and tallow. It is mixed hot in the double tank and a belt is either immersed in the tank, or the dressing is applied with a brush. All surplus dressing, which does not go into the belt, must be carefully wiped off, otherwise it will cause the belt to slip. A belt that is kept pliable and soft with this dressing will give the maximum pull without slip.

Glue.—After many experiments with all kinds of glue the following has been found to be the strongest, most reliable, and the easiest to use. To one gallon of melted cabinet glue, add one pint of the best gasoline. Mix while the glue is hot and apply to the belts while hot and at the consistency of a thin syrup.

BELT RECORDS.

The total cost of maintaining belts, including labor, supplies, and belting should be between 10 and 25 per cent. per year of the

*This table is very useful in repairing second-hand and damaged belting. The cylinder in the center is of hard wood and as it is pivoted 1¼ in. off center, all that is necessary is to shove the belt under it and the pull on the belt tightens it. *A* is a piece of glass inserted in the table to make a smooth working surface, and something that will not be cut up with a scraper. This end of the table is used principally for scraping off old glue and for trimming the ends of the belts. *B* on the other side of the roller is a piece of hard wood, raised about 1¼ in. above the table in order to permit the operator to use a plane without striking his elbow on the roller. This end of the table is used for dressing down splices preparatory to gluing. The roller will clamp a belt for either end of the table by simply reversing it over the center.

†This is the best device of the kind. With one of these stretchers one man can stretch an 8-in. double belt on the pulleys in ten minutes.

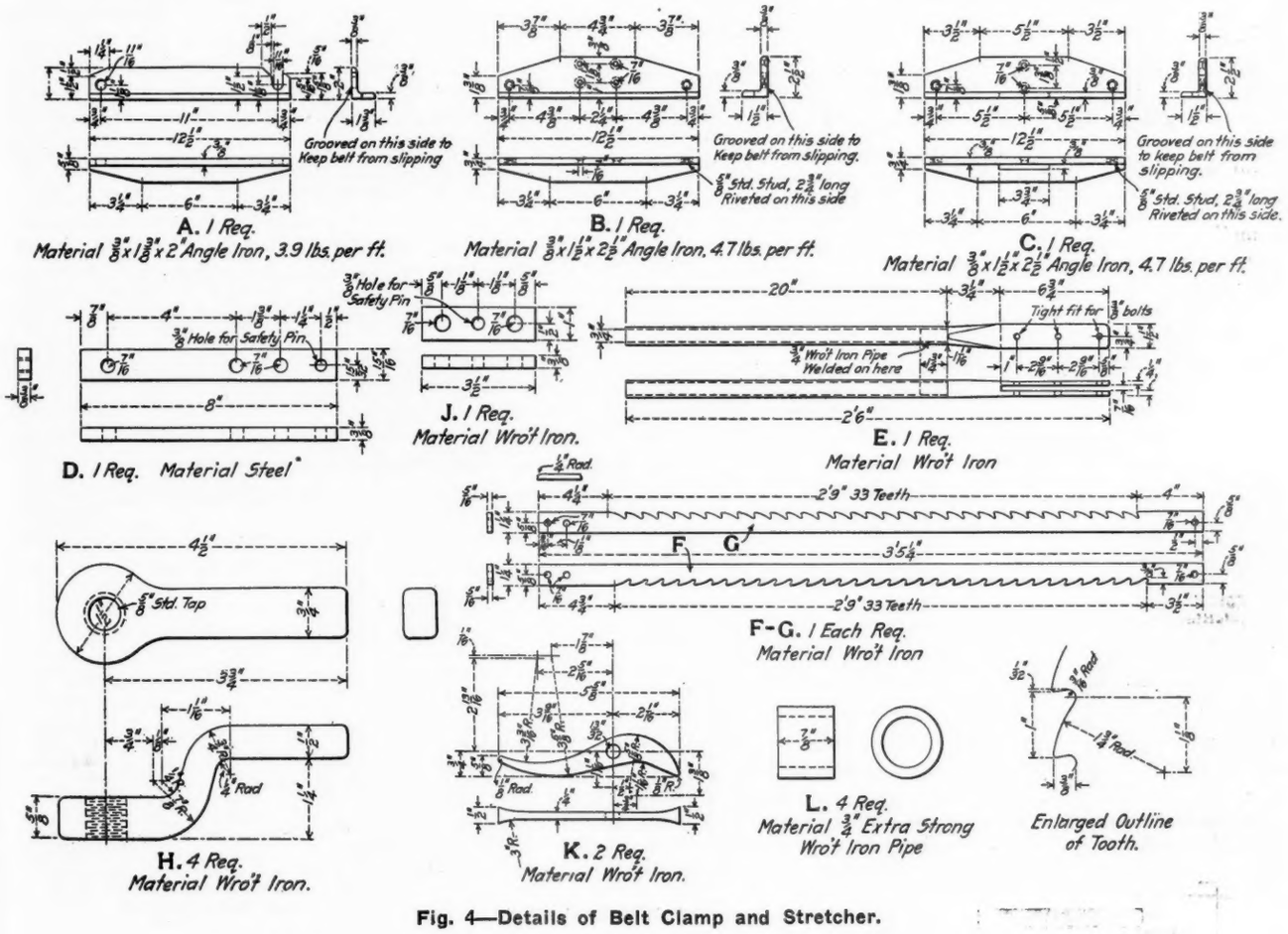

Grooved on this side to Keep belt from slipping
A. 1 Req.
Material ⅜"x1⅜"x2" Angle Iron, 3.9 lbs. per ft.
Grooved on this side to Keep belt from slipping.
⅝" Std. Stud, 2¾" long Riveted on this side
B. 1 Req.
Material ⅜"x1½"x2½" Angle Iron, 4.7 lbs. per ft.
Grooved on this side to keep belt from slipping.
⅝" Std. Stud, 2¾" long Riveted on this side.
C. 1 Req.
Material ⅜"x1½"x2½" Angle Iron, 4.7 lbs. per ft.
Hole for Safety Pin
D. 1 Req. Material Steel
J. 1 Req.
Material Wro't Iron.
Tight fit for ⅜" bolts
¾" Wro't Iron Pipe Welded on here
E. 1 Req.
Material Wro't Iron
F G
2'9" 33 Teeth
3'5¼"
F-G. 1 Each Req.
Material Wro't Iron
⅝" Std. Tap
H. 4 Req.
Material Wro't Iron.
K. 2 Req.
Material Wro't Iron.
L. 4 Req.
Material ¾" Extra Strong Wro't Iron Pipe
Enlarged Outline of Tooth.

Fig. 4—Details of Belt Clamp and Stretcher.

inventoried value of the belting when new. The belt failures should not be more than two to every 100 belts per month; no main drive belt should ever be allowed to fail, and no delay of over 10 minutes due to any failure should be tolerated. These results cannot be obtained by haphazard methods. In a shop running 1,000 or more belts there should be a regular foreman to keep the records and direct the work. He can also take charge of the oiling and abrasive wheels, and, in some instances, can also supervise the sweepers. A record should be kept of every belt on a card similar to the one shown in Fig. 6, and, in addition, a tickler should be maintained to show when certain

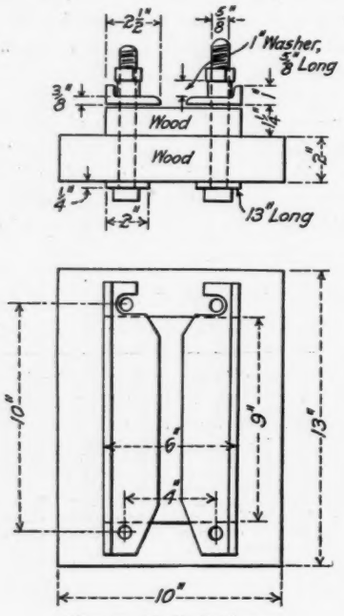


Fig. 5—Belt Splicer.

belts will probably need attention. However, the workmen must be encouraged to report the condition of belts; a daily round should be made to receive such reports, and, in addition, a pad and pencil should be hung at the belt room door where reports on belt conditions may be recorded. All regular repair work should be done at night.

MISCELLANEOUS RULES.

It would not be practical to change over the entire belting equipment in a plant at one time to bring it in accord with the most effective methods, but as belts are repaired and renewed they should be made to conform to the standard practice. When belts are taken down they must be measured and the exact length for a fit recorded on the cards. New belts should be ordered 6 in. shorter than the length for a fit and be put up with a 6 in. take-up piece in them. When ordering a belt for which the taped length, but not the length for a fit, is known, make the belt 1 in. shorter for each 10 ft. of length than the tape measured length over the pulleys. A steel tape should always be used. The proper initial tension for a belt at rest is 100 lbs. per sq. in. of cross section, but it is seldom practical to measure this tension. No belt should be run tighter than is necessary to pull the maximum load imposed upon it.

In figuring the size of belt allow 80 sq. ft. of double belt, or 160 sq. ft. of single belt, to pass over the pulleys per minute. This figure is more liberal than is often allowed, but has been found to be the best when viewed from all standpoints. Belts should not be run over 5,000 ft. per minute. The most effective speed is about 3,000 ft. per minute. Use pulleys 25 per cent. wider than the belts. Pulleys should be crowned for belts that do not shift upon their face, and straight for shifting belts. That is, in the case of a drive from a line-shaft to a countershaft with a tight and a loose pulley, the pulley on the line-shaft should have a straight face, while the tight and loose pulleys should have crown faces.

Belts which have become greasy and dirty should be cleaned with gasoline; then scraped, wiped with waste, and treated with the mixture of fish oil and tallow. No other dressing, rosin, or dope of any sort should be used on the belts. Belts running in dusty places should be occasionally brushed off.

Double belts should not be run on pulleys less than 6 in. in diameter and triple belts on pulleys less than 20 in. in diameter. Very short drives should be avoided. Wherever possible run belts so that they will sag on to and not away from the pulleys. Run single belts with the hair side (dressed side) next to the pulley. The feather edge of the splice should be away from pulley towards which it runs.

All machines furnished with any means of taking up the stretch should have endless belts. Large overhead drive belts (over 6 in. wide) should be made endless as soon as the stretch is taken out. It is not advisable to make new belts endless at the installation because of the stretching. Wood-working machinery having belts which do not require too frequent tightening will run better with endless than laced belts; side and bottom head belts on planers, matchers, etc., should be run endless. Belts should never be run twisted or cross-stepped on cones.

No mineral oil should be allowed to come in contact with the belts. New belts should be treated with the dressing of fish oil and tallow before using, and any belt which becomes dry, hard and glossy in service should have an application of the dressing. Belts in blacksmith shops should be closely watched. The dressing will check, to a large extent, the evil effects of the smoke, sulphurous gases, and dirt, and the life of the belt will thereby

BELT RECORD CARD

Width: _____ Thickness: _____ Length: _____

Shop: _____ Machine: _____ Position: _____

Requisition issued: _____ Requisition filled: _____

Purchased from: _____ Cost: _____

Scrapped: _____ Scrap value: _____

Max. Speed: _____ Max. Power: _____ Max. Tension: _____ Splices: _____

INTERRUPTIONS

REMARKS

DATES	MAINTENANCE	DATES	CAUSE	
	Put on by			
	Tightened, ins. taken up			
	" "			
	" "			

Fig. 6—Belt Record Card.

be lengthened. Keep pulleys clean and avoid having mineral oil or grease come in contact with the belts. If hard grease or dirt is allowed to pile up in the corners of the cones so as to form a fillet, the belt will be very likely to climb, turn over or twist. In turning faces of cones a clearance should be cut in the corners.

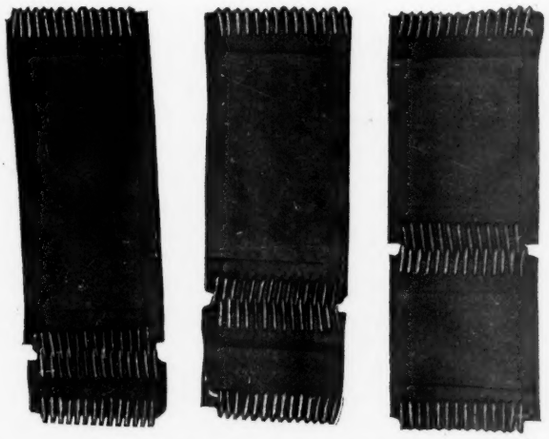


Fig. 7—A Series of Take-up Pieces.

In throwing belts onto pulleys, first put the belt on the driven pulley (loose if there is one) and then run it onto the driving pulley. Avoid accidents by stopping the motor or engine and then run the belt on while starting slowly. Care should be taken never to run a belt off a moving pulley onto some part of the shafting or the machinery on which it may catch. If it is necessary to cut a belt down, care should be taken not to waste the leather.

A belt should never be dampened in order to open a splice. An awl should be used, gradually scratching or ripping the splice apart. It is good practice to remove the tension from belts by lifting idlers, running off of pulleys, or removing from the machine when convenient at quitting time. All cone and other machine belts should be run off of pulleys at quitting time on Saturdays.

KIND OF LACE TO USE.

For general service, the machine lace should be used and new belts should have a 6-in. take-up piece put in them to permit

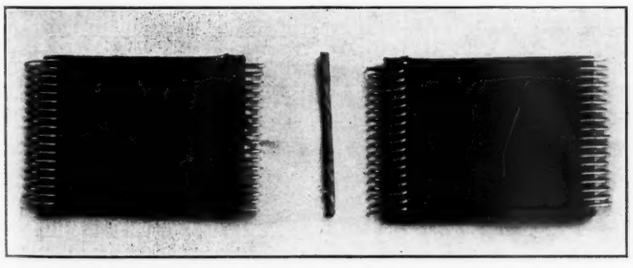


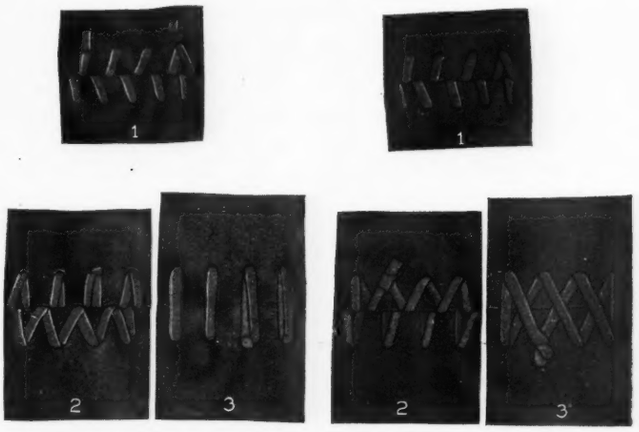
Fig. 8—Two Take-up Pieces and Rawhide Connection Pin.

tightening of the belt by putting in a shorter piece and thus avoiding the need of taking the entire belt down. Belts with the machine lace should have a take-up piece in them at all times. Pieces should be kept in stock in sufficient numbers to avoid the necessity of making one in an emergency.

The lengths should be 6 in., 5 in., 4 in., 3 in., 2 in., and 1 in. (Figs. 7 and 8). The hand-wire lace may be used to hold very thick belts and small feed belts which the machine lace will not accommodate. The rawhide lace may be found by trial to give better service on some wood-working machines than either the Jackson or Kerr laces, but it is generally best to make the belt endless if neither the hand wire nor the machine laces give satisfaction.

MACHINE LACE.

Follow instructions accompanying the machine carefully. Be sure to use a needle of the size specified for the belt which is to be laced. Too small a needle will stall while too large a one will be spoiled by forcing through the rolls. Clamp the belt lightly at first and tighter if the needle sticks. Under no circumstances should the two set blocks in front of the roll be set tight against the rolls. They are merely a steady rest and will bend the roll if set tight. After lacing, the wire should be flattened into the belt by squeezing and hammering. Fasten the ends of the wire by cutting the coil about ⅛ in. from the belt, bending into a semi-circle and driving into the leather. Use as large a rawhide pin as will go through the lacing. Cut off the ends a little inside of the edge of the belt in order that the pin will not catch the hands when the belt is thrown or shifted. A right and



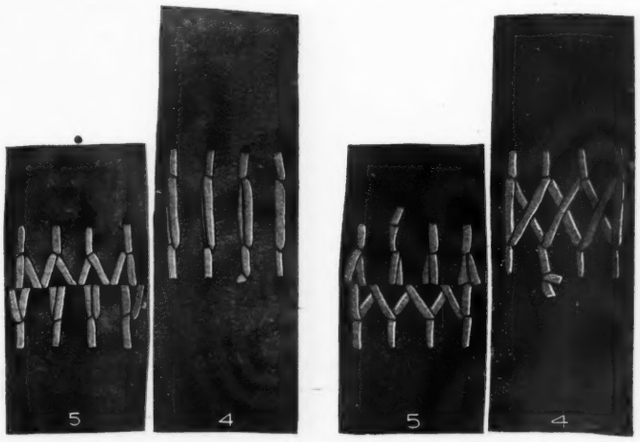
Corresponding numbers show the two sides of the same lace.

Fig. 9—Rawhide Laces.

left hand lace should always be mated together. Material should be used with an eye to economy. Rawhide pins can often be used again when removed. Blunt needles can be repointed with a file and coils of wire should be cut close to the belt.

RAWHIDE LACES.

Single Hole, Single Hinge Lace (No. 1, Fig. 9).—Use for light grade single belts running over small pulleys (6 in. diameter or under) at high speed and transmitting light power. In making this lace it is necessary to have an even number of holes in one end of the belt and an odd number in the other end so that the holes in one will come opposite the spaces in the other end. Bevel off the edges of the belt on both sides. The holes should be evenly spaced on a center line square with the side edge of the belt and not less than ¾ in. from the end. Use a No. 6 oval punch. Place the long diameter of the oval lengthwise of the belt. Begin at the center hole and draw the lace through until



Corresponding numbers show the two sides of the same lace.

Fig. 10—Rawhide Laces.

half is on each side of belt. Then pass one end down through between the ends of the belt and up through the next hole towards edge. Repeat until the edge is reached with both ends of the lace. Cut a slit back of the last hole with a knife and fasten the lace by passing it through this slit and into another slit back of first slit and cut back into the belt. Pull the laces as tight as possible. Either side of the lace will run next to the pulley.

Single Hole, Double Hinge Lace (No. 2, Fig. 8).—Used for medium and heavy grade single belts running over small pulleys (6 in. diameter or under) at high speed and transmitting heavy power. In making this lace the same number of holes should be punched in each end of the belt and they should be evenly spaced on a center line square with the edge of the belt and not less than ¾ in. from the end. Use a No. 6 oval punch. Place the long diameter of the oval lengthwise with the belt. Bevel off the edges of the belt on both sides. Begin at the center and double lace. Pull the lace through until half is on each side of the belt. Pass the lace through between the belt ends and back through the opposite hole repeating this operation until the edge is reached, then back to the starting point in the same manner. Fasten by doubling one end back through the last hole and catching the other end in a loop. Cut off the lace ¼ in. from the belt and notch. Pull the laces as tight as possible. Run either side of the lace next to the pulley.

Single Hole, Double Straight Lace (No. 3, Fig. 9).—Use for light and medium grade double belts for running over large pulleys (16 in. diameter or over) and transmitting light power. In making this lace the same number of holes is punched in each end of the belt and they should be evenly spaced on a center line square with the edge of the belt and not less than ¾ in. from the end. Use a No. 6 oval punch. Place the long diameter of the oval lengthwise of the belt. Begin at the center and double-lace, pulling the lace through until half is on each side; then on the pulley side go straight to the opposite hole, through this and across to the hole next towards the edge of the other side. Repeat until the edge is reached then lace back to the starting hole in the same manner and leave the ends as with the double hole, double straight lace. Pull the laces as tight as possible and run the straight laced side next to the pulley.

Double Hole, Double Straight Lace (No. 4, Fig. 10).—Use for light, medium and heavy grade double belts running over large pulleys (10 in. diameter or over) and transmitting heavy power. This lace can also be used to advantage in a belt when the single hole lace has pulled out the holes. In making this lace the same number of holes is punched in each end of the belt. The holes are evenly spaced on center lines square with the edge of the belt, the first one not less than ¾ in. from the end and the second one not less than ¾ in. from the first one. Use a No. 6 oval punch. Place the long diameter of the oval lengthwise of the belt. Begin at the center and double-lace as with the single hole, double straight lace, except to pass every other time through the second line of holes. Pull the laces as tight as possible. Run the straight side next to the pulley.

Double Hole, Double Hinge Lace (No. 5, Fig. 10).—Use for medium and heavy grade single belts, and in light grade belts running over small pulleys (10 in. diameter or under), at high speed and transmitting heavy power. This lace can also be used to advantage in a belt where the single-hole lace has pulled out the hole. In making this lace the same number of holes is punched in each end of the belt. The holes should be evenly spaced on center lines square with the edge of the belt, the first one not less than ¾ in. from the end and the second not less than ¾ in. from the first. Use a No. 6 oval punch and place the long diameter of the oval lengthwise of the belt. Bevel off the edges of the belt on both sides. Begin at the center and double lace the same as with the double hole, double straight lace, except to pass every other time through the second line of holes. Pull the laces as tight as possible and run either side of the belt next to the pulley.

HAND WIRE LACE.

To be used in small shops where there are not enough belts to necessitate a lacing machine; also to be used on small feed or pump belts or on belts over ½ in. thick which cannot be handled in the machine. Follow directions on box. Groove the belt for the straight side of the lace which should be run next to the pulley. Care should be taken not to cross the wires.

CEMENT SPLICES.

The first thing to be done in making a cement splice is to see that the pieces to be put together are of about the same grade, width and thickness. See that the splices lie in the same direction in the same belt. Splices should be made the length given in following table:

Width of Belt.	Length of Splice.
1-in.	5-in.
2-in.	5-in.
3-in.	6-in.
4-in.	6-in.
5-in.	7-in.
6-in.	8-in.
7-in.	8-in.
8-in.	9-in.
9-in. to 18-in.	Same length as width.
over 18-in.	18-in.

The splices should be worked down to a perfectly smooth even surface, square with the edge of the belt, both at the point and back. Care should be taken that the splice is no thicker than the rest of the belt. If the splice is thicker, the belt will not run even. Square both ends of the splice from the same edge of the belt. Work on a perfectly smooth flat surface. After dressing the ends for the splice, place them together on a board 1 in. longer and ½ in. wider than the splice. Place the edge from which the splices are squared in a perfectly straight line. Tack the belt to the board just back of the splice. Open the splice and spread on the hot glue; place another board on top of the splice and clamp tightly with hand clamps or in a press (an old letter press makes an excellent belt press). If the press is used, ten minutes is long enough to keep the pressure on the belt, but if hand clamps are used they must be left on for three or four hours. In either case, the belt should not be put under tension for at least five hours after gluing. Paper placed between the boards and the belt will prevent the belt from becoming glued to the board.

Greasy belts should be cleaned in gasoline before attempting to cement them. Any grease in the belts or glue is liable to cause the splice to fail. No rivets, wire, pegs, or any other fastenings aside from cement should be used in splicing belts. When a repair man becomes expert he will find that it is not necessary to clamp the spices after they have been glued. All that is necessary is to peen the splices with a flat faced hammer working from the center towards the edges and being careful to work out all irregularities and air bubbles. The methods described above have been used in several large and a number of small shops with great success.

An electric locomotive (4-4-2) for express-train service on the Dessau-Bitterfeld Railway, Germany, is driven by an alternating-current commutator motor of 1,000 h. p., designed to give a traveling speed of about 68 miles an hour. The current is taken at a pressure of 10,000 v. from the overhead contact line by two current collectors, and is led through a choking coil, serving as a protection against excess pressures, to the main oil switch. The latter is provided with auxiliary and main contacts, an equalizing resistance being placed behind the auxiliary contacts in order to reduce the shock on switching in. From the oil switch the current passes to the high-tension winding of a main transformer of which the low-tension winding is provided with a number of tappings to enable the motor voltage to be varied according to the required tractive effort and speed. In addition a static balancer is provided, which also has a number of tappings, by means of which the armature winding may be adjusted to a special voltage. The motor is mounted high in the frame and drives the four coupled driving wheels through an intermediate crank shaft at about 400 revolutions per minute at the highest speed. According to tests made in Bitterfeld the locomotive developed a tractive effort of 19,000 lbs. when starting.

BENEFITS DERIVED FROM THE MASTER PAINTERS' CONVENTIONS.*

BY C. E. COPP,†
Master Painter, Boston & Maine, Lawrence, Mass.

Travel Broadening to the Mind.—To get out of one's own town and state occasionally is a great help educationally. It has been justly said that "the intellectual and physical benefits derived from traveling are manifold. Nothing tends so much to enlarge the mind." "The traveled mind," says Mrs. Alcott, "is the catholic mind educated from exclusiveness and egotism." To be narrow in anything—politics, religion or one's business pursuit—is to stay at home in one's limited sphere imagining that all the world is contained within the surrounding horizon. When a mechanic begins to go abroad in the world to see how others do things, if he is teachable by observation, he will soon realize how little he knows and how much he wants to know. In this way he becomes a broad and efficient servant of the company that employs him. Some convention trips will have a marked effect in the development of any man who is susceptible of improvement. His diffidence will give way to confidence and ability.

Benefits the Health.—Whatever improves the mind has a corresponding benefit to the body. There is a physical benefit to be derived in the release from the daily care and grind at home and coming in contact with others who are perhaps as badly off, if not worse, than one thinks he is. He feels rested and sharpened by this experience for his home duties as he can be in no other way. He goes at his own tasks with greater avidity than ever, with a view to excel in them. A vacation in the country to visit, hunt, fish and rusticate is good, but it will not sharpen one's wits for his work like the contact with his fellow-workmen. "Iron sharpeneth iron," says an old adage. So men's minds are sharpened by contact, and their sluggish blood seems to circulate the better. Of course, conventions have their temptations to over-indulgence upon weak-minded men, but these men are not without temptations in their home towns. They must learn to withstand these, and conventions are as good places to practise virtues as elsewhere. Man is a probationer everywhere. Here is an enlarged sphere to put himself into action and on record. If he succeeds he will strengthen himself for home duties. If he fails he still has a future to recover himself in. There is good fighting ahead for us all, with some defeats but many victories. When some men learn that the conventions are not places for the free rein to indulgence they will have learned a great lesson.

Benefits of Social Intercourse.—Men will "talk shop" out of meeting, and some of the personal interviews with a distant coworker are more valuable than even a convention discussion. Many a man has gotten hold of a kink in this way that he would not have known of otherwise. The good things in a convention are by no means all reported in the proceedings. The cold type cannot convey the warmth of personal contact in look and action. It does not, of course, carry to the stay-at-home reader what the attendant learned there out of meeting, and it hardly conveys all he learned in the meeting.

There is an aversion among some to "talking shop" at these places, it is true, as they seem to think they are off for a good time. But without being bored there are many opportunities for interchange of ideas. Two will be seat-companions for a time in the hotel lobby, or on an afternoon ride, or before the meeting opens, and what has been a burden to one's mind is no offense to the other when information is asked. Then the large attendance of the ladies lends a helpful tone to the social intercourse and a moral tone to a convention of men that would be hard to overestimate. My wife has accompanied me at sixteen of the conventions I have attended, and some of my daughters have been with me at others.

Educational Value of Conventions.—The convention is an annual interchange and clearing house of ideas. The exhibits are also instructive. Thoughtful minds are at work the year around to devise topics for discussion. Things of national importance and world-wide interest are constantly coming up. The colleges do not contain all the faculty and students in the world's work. All who deserve them do not have B. A. or A. M. after their names. Some of the most studious men are at the bench, lathe, forge and vise and have not been graduated yet, though well past three score years. They are rich in experience and are at problems whose deductions are seldom seen and heard in college halls, but are no less important. Some of the most alert and astute minds can be found in mechanical offices early and late struggling with problems much harder to solve than any they found at school. Their school days opened their minds to grasp them. The fruit of their thoughts shows itself in successful railway maintenance and in our convention halls. What is thought of the work of the conventions may be learned of our secretaries, who frequently receive requests for copies of the proceedings for libraries and reading rooms the country over. This should stimulate every thoughtful contributor to our conventions to do his best work. These things are not confined to such a limited sphere as some are apt to think.

The successful operation and maintenance of the railways today is very largely the result of convention deliberations. If men had stayed at home with an imaginary "Chinese wall" around them this country would be as far back as is the Chinese Empire instead of in the forefront of progress and invention. And the end is not yet. There is still room for progress and improvement, and our railway clubs and conventions will bring it out. It is a case where Mahomet had better "come to the mountain," pay his dues and get it, rather than stay at home and expect the mountain to come to him.

*Entered in the competition which closed October 15, 1911.

†Mr. Copp has attended nineteen consecutive conventions of the Master Car and Locomotive Painters' Association, in at least fifteen cities of the United States, and has presided over four of them.

PATTERN SHOP KINKS.

BY A. G. PANCOST,
Elkhart, Ind.

BENCH MORTISE BLOCK.

The mortise block shown in Fig. 1 is simple and is useful for small work. It consists of a wooden block cut with a lip to fit over the edge of the bench, the other end being left about twice as thick as the body. Forty-five deg. slots are cut on both sides of the straight slot. The illustration shows a molding in position for cutting.

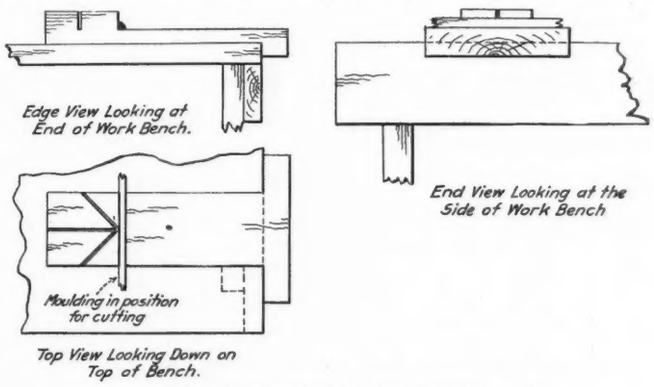

Edge View Looking at End of Work Bench.
End View Looking at the Side of Work Bench
Moulding in position for cutting
Top View Looking Down on Top of Bench.

Fig. 1—Bench Mortise Block.

PATTERN MAKERS' PAINT POT.

The pattern makers' paint pot shown in Fig. 2 is made by covering a 6 in. x 8 in. glass battery jar with a funnel shaped copper or galvanized iron cover, as shown. This cover is tight fitting and allows the handle of the brush to extend through the top. This prevents the paint, which usually con-

sists of lampblack and alcohol from evaporating rapidly and drying up. A ½-in. strip of galvanized iron is placed across the pot near the top for wiping the brushes.

MOLDS FOR FIGURES AND LETTERS.

A method of making figures and letters from ¼ in. to 1¼ in. high for use on patterns is shown in Figs. 3 and 4. In order

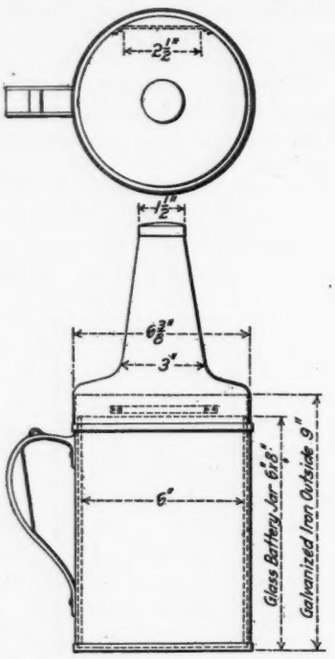


Fig. 2—Pattern Maker's Paint Pot.

to get the first impression it is necessary to purchase two sets of each kind of letters or figures desired. The larger ones may be cut from ⅛ in. fiber with good results. These are then carefully tacked to a bottom board *C* and are covered by a top board *D* which is cut out over the letters, as shown. The board *D* is held to the board *C* by wooden pins glued in both ends of *C*. Plaster of paris is poured over the letters and is allowed to harden, thus making a negative cast of them. This cast is cut with a pocket knife, as shown in Fig. 3, which,

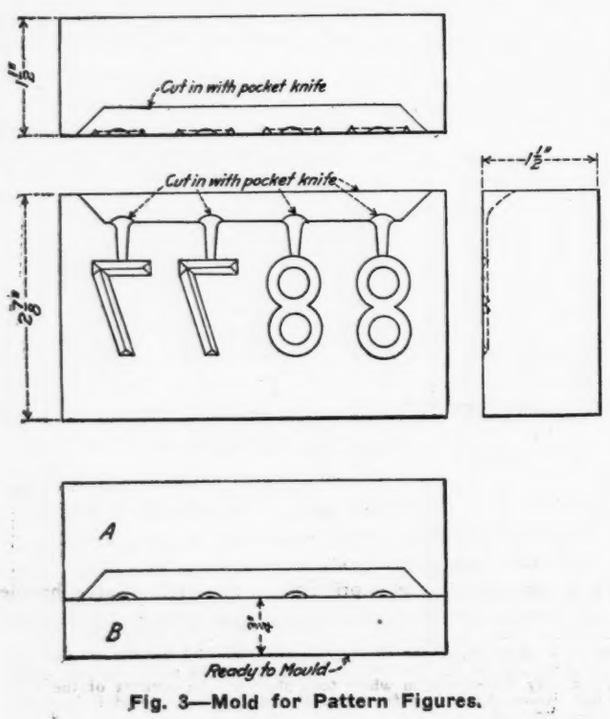


Fig. 3—Mold for Pattern Figures.

when the mold is clamped to a plain block of plaster of paris, allows the metal to be poured, forming the figures. In making the plaster molds the plaster of paris and water should be mixed quite thin and the mixture should be stirred freely with

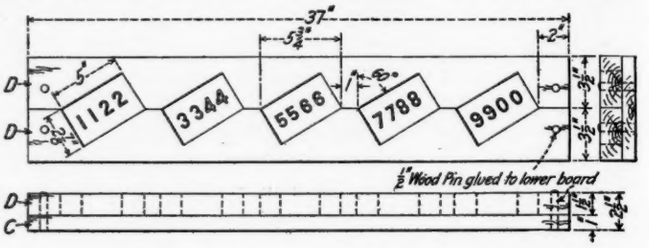


Fig. 4—Patterns for Molding Figures.

a stick to remove all air bubbles. For the letters or numbers themselves use equal parts of solder and lead; the solder makes the figures more firm and gives them a glossy finish, to which the molding sand is less liable to stick.

BENEFITS DERIVED FROM THE TOOL FOREMEN'S ASSOCIATION.*

BY E. J. M'KERNAN,†
Supervisor of Tools, Atchison, Topeka & Santa Fe, Topeka, Kan.

At our last convention the making of large frame reamers from high speed steel was discussed. The general opinion was that it was not economical for railway shops to manufacture such reamers from high speed steel as the service which they gave did not pay for the labor and material which was necessary to make them; also they would not stand the severe shocks which they are liable to receive when used by unskilled mechanics who do the heavy reaming with air drills. The ordinary carbon steel reamers will stand more severe shocks and will bend before breaking. It may be possible that they will require grinding more often than high speed steel reamers, but this is of minor importance.

It seemed to be the unanimous opinion of the members that all threads for locomotive boilers, such as for washout plugs, boiler checks, blowoff cocks and all boiler cab fittings, should be 12 thread and have a taper ¾ in. in 12 in.; this reduces the number of taps to be carried in the tool room, thereby materially reducing the cost of maintainance.

The general practices of treating and tempering both high speed and carbon steels are becoming more thoroughly understood. At the convention each member freely imparts his knowledge and experiences, and there is practically no excuse for a tool room foreman mishandling the steel after hearing the expressions by the different members. I have tried out different things which were mentioned at these meetings, and have found them to be very satisfactory.

The discussion of the proper steels for making dies for bolt and forging machines was also helpful. These dies are generally complicated and require a large amount of steel. It was found that several shops secured very good results from dies made of alloy steel. While the first cost is more than the dies made from low carbon steel, their performance is better and the output is from three to four times greater than from dies made of other grades of steel; they withstand the action of the intense heat and the water.

It will be impossible for the tool foremen to have the advantage of participating in the different discussions, as well as personally seeing the demonstrations which are generally given at the conventions of this kind, if they are not permitted to attend the meetings and visit other shops. In order to broaden out and increase the output, the foreman should be permitted to attend the convention and exchange ideas with other foremen.

*Entered in the competition which closed October 15, 1911.

†Mr. McKernan is president of the American Railway Tool Foremen's Association.

OXY-ACETYLENE WELDING.*

BY H. T. BENTLEY,

Assistant Superintendent Motive Power, Chicago & North Western.

There will be lots of disappointment in store for the man who thinks he can get immediate results, especially if you are making your own operator. We began in a humble way about 18 months ago and thought that inside of a week or two we would be welding up flue sheets, putting patches in fire boxes, repairing castings and a hundred other things our friends had told us could be done so easily. Nothing went right; a crack would be welded in one place only to open up again or start another in a different place. We had some comfort from the fact that even the so-called experts fell down. A casting was broken which we desired to have repaired at once, and, having oxygen and acetylene on the ground, we thought it would be a good opportunity to let some of the people who were so anxious to show us how it could be done, have a chance at it. This we did, and with miserable results, the operator claiming the iron was so poor that he could not get anything suitable to work on. After this some of our men felt very discouraged at the results obtained, but others were nearly as optimistic as I was, although after four months of trials and tribulations, if a vote had been taken, it would have been overwhelmingly in favor of dropping the whole thing. Finally we were able to weld up some unimportant castings which gave us fresh courage. We were having considerable trouble with cracked flue sheet bridges on certain engines and tried to weld them. Before trying it on a flue sheet in place, we got an old one and experimented for days with it, sometimes having more cracks at night than when we started in the morning. At last we appeared to have solved the difficulty and started on a flue sheet in a boiler; all we had learned on the flue sheet that could expand and contract without having anything to prevent it, had to be learned over again when the sheet was held rigidly in place without an opportunity to move in any direction. We were, however, after considerable experimenting, able to handle this kind of work in a satisfactory manner. Those having experience with boiler work will appreciate what it means to be able to do a job of this kind on a flue sheet that is otherwise in good condition.

One morning we were confronted with a rush job which, if successful, would mean a great deal to us. A superheater locomotive was in the shops with a cast iron steam pipe cracked for a distance of 14 ins. Unfortunately, as it appeared at the time, we did not have a new steam pipe, nor a pattern to make one and the engine was needed badly. Fortunately, we had the oxy-acetylene apparatus, and after a council of war, it was decided to try to weld up the steam pipe, although most of our men thought it could not be done satisfactorily. The attempt was made, and much to our surprise a first-class job was the result, which tested out O. K. This gave us confidence and other jobs were undertaken, some of which turned out well and others were failures. At about this time we got hold of an operator who used his head while doing his work, and after that it was comparatively easy; nothing was too complicated to tackle, and we are able to successfully weld cracks in fireboxes, apply patches, weld in half side sheets, repair broken cylinders, weld broken driving wheel spokes, build up worn parts on castings, air reservoirs, etc., and repair broken castings of all kinds; now we cannot keep house without it. A saving of from $1,200 to $1,500 can easily be effected per month in a shop like ours by repairing parts that otherwise would find their way into the scrap; this amount simply covers the actual saving, and does not in any way take into consideration the value of the time an engine or machine may be out of service.

*From a paper read at the October meeting of the Western Railway Club.

The government railways of Russia have had a record year in the matter of prosperity. The gross revenue for the fiscal year of 1910 was $577,171,982, as against expenditures of $314,800,000.

PRACTICAL APPLICATION OF SCIENTIFIC MANAGEMENT TO RAILWAYS.

Wilson E. Symons of Chicago, formerly superintendent of motive power and equipment of the Plant System, and later mechanical superintendent of the Gulf, Colorado and Santa Fe, and superintendent of machinery of the Kansas City Southern, presented a paper on the above subject at a joint meeting of the Franklin Institute* and the American Society of Mechanical Engineers at Philadelphia, Pa., October 18, 1911, in which he presented statistics as to the mileage, equipment, capitalization, officers and employees, volume of business handled, and the income and expenses of the railways of the United States. Referring to scientific management and the proposed saving of one million dollars a day by its application to the railways he said: "Although it is claimed that this new plan or system is applicable to most all items of expense (material and labor) on a railway, the estimated probable economies will, in this treatment of the question, be confined to such branches of the work, or classes of employment, as in my judgment are susceptible of being placed on a comparative basis with large manufacturers of standard articles."

Mr. Symons did not define just what he meant by the expression scientific management. That he considered it in a narrow sense is indicated by the fact that although the railways employed 1,502,823 persons in 1909, whose wages amounted to $988,323,694, Mr. Symons by a process of elimination concluded that the principles of scientific management were applicable to the machinists and other shop men only. This includes only 243,347, or 16 per cent. of the total number of employees.

After drawing attention to the fact that "repairs to the equipment are of such a character that they are not susceptible of predetermination as to methods of operation or cost and cannot, therefore, be reduced to writing, blue print or graph, but must be handled by experienced, practical men, who, usually, like the skilled surgeon, decide on the exact method or details of procedure while gathering instruments, tools and material to perform an operation," Mr. Symons concludes that it might be possible to make a saving of $78,242 per day. This, "on the assumption, however, that additional tools, shops, supervision, etc., be provided to enable the officers in charge to secure a greater output on the same expenditure, or the same output at a less expense and that the organization of the department should be on lines calculated to strengthen the hands of the line officers in charge who, in the last analysis, are always held responsible for results."

An analysis is made of the results that have been obtained on the Santa Fe and a comparison is made with other roads in the same territory, and also with the average results which are obtained throughout the United States, from which the conclusion is drawn that the Santa Fe, which is now and has for six years been under heavy expense maintaining the betterment plan, "has a maintenance of equipment cost of over five million dollars per year above an average for the United States and is far in excess of most of the other lines similarly situated."

Two examples are then cited of roads on which the efficiency of the mechanical department was very greatly increased by reorganizing it. Efficiency engineers were not used to bring this about, but unfortunately Mr. Symons does not go into the methods which were used, but simply presents a statement of the results which were accomplished.

The necessity of having additional supervision in the way of staff officers is emphasized and the following are laid down as the qualifications for an officer who is in charge of men or of any work involving contact with them:

First, As a fundamental principle, a man who cannot handle himself cannot handle others, although it is a notorious fact that

*It is the intention of the Franklin Institute of Philadelphia, Pa., to issue a special number of its Proceedings which will contain Mr. Symons' paper, and not only the discussion which took place on the evening of the meeting but written discussions from several members who found it impossible to attend and take part.

men who have little or no control of themselves actually believe that they have great ability to handle or control others.

Second, No man who is not well within self-control should ever be placed in charge of others. Disregard of these two cardinal principles in the selection of railway officers has driven more men into labor unions, and created more anarchists, than any other influence, and in addition has cost the railways untold millions of dollars that should have gone to employees and shareholders.

Third, No man should be placed in charge of men who is not personally familiar, from practical experience, with the work, or that of a corelative character, so as to enable him to intelligently direct others, and with a sufficiently liberal education to enable him to transact business with his colleagues, superiors, and the public, in a gentlemanly, business-like manner, and with capacity for increased responsibility.

A large part of the remainder of the paper is devoted to replying to an article in *Hampton's* for March, in which the statement was made that two million dollars a year were wasted on lubricating oil. Considerable attention was also given to refuting a statement in one of the popular magazines that the railways were run by "rule of thumb."

DISCUSSION.

The discussion of the paper was lengthy and was participated in by representatives of manufacturing establishments, efficiency engineers and railway men, although only one of the latter went into the question exhaustively.

S. M. Vauclain, of the Baldwin Locomotive Works, emphasized the fact that the comparison of locomotive maintenance on the cost per locomotive basis was unsatisfactory because of the steady increase in the size of locomotives during recent years. This expense is also increased at this time because of the number of devices which are being experimented with and applied in the effort to improve the efficiency of the locomotives. It is also necessary to operate the trains at higher speeds than formerly, and this adds to the expense of operation. He concluded with this sentence: "I believe in scientific management and in economic management, but I do not believe in espionage over human beings that grinds them down and makes them feel that they are owned body and soul by the men who control them."

Frank B. Gilbreth, who has achieved wonderful results in the application of motion study to the laying of bricks said: "So far as the railways are concerned I agree with the railway men. I do not see how they can put in scientific management immediately; it will take a long time to instal it. If it has taken a long time to build up these principles here; if it has taken a long time to convert the neighbors of Mr. Taylor right here in this city, what do you expect elsewhere?"

The following extracts are taken at random from Harrington Emersons' remarks, which were quite lengthy: "I know that the expenses of operating and maintaining the railways in the United States could be reduced several hundred million dollars a year. This reduction could not be effected without the earnest, patient and wise co-operation of railway owners, railway employees, the public—both individually, corporately and represented by its state and national governments—and by a body of competent, efficient councilors and scientific managers. This reduction in expense can be brought about with great gain to each of the four classes and not at the expense of any class for the profit of any other class."

"My own theory is that the railways, to a higher degree than industrial plants, apply scientific management, . . . the railway with very fast trains run in all weathers over long distances is one of the best examples the world has ever seen of the accurate and perfect results resulting from scientific management."

"The aims of scientific management applied to railways are not to ask for the discharge of a single man on account of the introduction of efficient methods. They are to lessen the toil, hardship, danger, friction and fluctuation of employment, to a less or greater degree affecting every railway employee. Also to increase the pay of those who are carrying on railway work and to increase the security of values in railway investments and ultimately to lessen the cost of railways to the public."

"Since the famous rate era, I have been obliged to revise my estimate of the million dollars a day. I have put in the good part of last year going over the different items of railway expense, and, with due deliberation, I place the ultimate waste at two million dollars a day." The remaining part of his discussion was largely given over to a criticism of the various parts of Mr. Symons' paper and in commenting on some of the ways in which the large saving above-mentioned might be accomplished.

B. B. Milner of the Pennsylvania said that he had visited the Santa Fe a number of times looking into the betterment work on that system. While the bonus system was enthusiastically carried on and was far ahead of the day work system, the improvements were those which would be expected from the substitution of any reasonable, well administered reward system of labor payment, free from hindrances on the part of the labor organizations. Special attention was also paid to the tool equipment and other conditions affecting the efficient operation of the shop. While great improvements were made as compared to former practices the shop methods were apparently no more efficient nor economical than those in other well regulated shops.

"Very glowing statements were made of the improvements effected, supported by various statements and graphical data. In some instances, deductions were made therefrom which the data could not support before one familiar with railway operations. In some cases, data submitted for the support of conclusions seemed to be at variance with actual facts. This is very naturally a result of pressure brought to bear upon specialists for results, and it very frequently happens that specialists themselves are mislead, having every confidence in data which does not, upon careful analysis, support their conclusions."

"Various meanings have evidently been applied to the term scientific management, and many differences in opinion might easily be reconciled by the adoption of a common definition of the term. If scientific management means that which appeals to many upon casually reading Mr. Taylor's paper on Shop Management, or upon the first visit to a plant such as the Tabor Manufacturing Company's, in Philadelphia, where the so-called scientific management is in operation, then the term is a misnomer so far as railway operation is concerned, and Mr. Symons must be very liberal in restricting its possible application to as much as 16 per cent. of the carrier's employees. But if the term is given the broader definition evidently attached to it by Mr. Emerson, and is understood to cover the whole field of human endeavor and to involve the elimination of every waste as soon after its development and isolation as practicable, then Mr. Symons must remove the restrictions imposed upon its application until every phase of railway operation is covered. It then becomes applicable to the labor and material expenses, at each desk of each office, of every department, and to all phases of operations involving expense or efficiency of service.

"The economical repair of rolling equipment involves the proper location, installation, maintenance and efficient operation of the railway shops, their component departments and the tools therein, with the economical purchase of all materials required in connection therewith. But, the economical operation of the railway involves not only the economical maintenance of its rolling equipment (costing only about 20 per cent. of the total operating expenses) but also the efficient use of that equipment. Cars must be loaded to the maximum consistent with the service rendered; trains must also be so loaded, speeds must be those most economical, light car and locomotive mileage must be avoided, and cars and locomotives of ever increasing efficiency from service and maintenance standpoints must be developed, etc. In so far as the efficiency of all these elements of operations is improved, by so much the items of labor cost, mentioned by Mr. Symons as being excluded from the application of scientific management will certainly be lowered. The carriers have spe-

cialists, inside and outside the ranks of their own employees, engaged upon the study of direct and indirect means of furthering economy in most every item of expense mentioned."

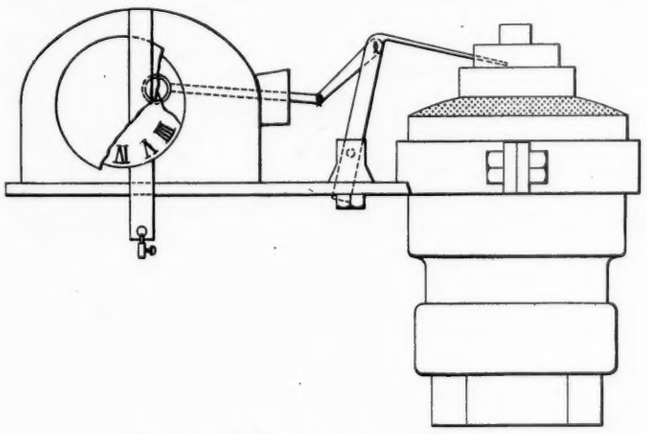
"In conclusion let the term scientific management be defined and understood in the broadest sense, remove the restrictions popularly imposed upon its application, eliminate the idea that the means of its application consists so largely of spectacular elements to which such strenuous objection is frequently unreasonably raised, and that efficiency is so largely evidenced by the spectacular results of which so much has been heard, and let the means of permanently instilling principles of broad scientific management into the minds of individuals composing the masses, as well as others employed by the carriers, be pushed persistently and consistently along broad lines, that results may be obtained that are permanent and real. The possibilities of such procedure cannot be accurately estimated."

SAFETY VALVE DISCHARGE RECORDER.

BY F. J. ZERBEE,
Master Mechanic, C. C. C. & St. L., Bellefontaine, Ohio.

The fact that a 3¼-in. safety valve when blowing off wastes coal at a rate of about 975 lbs. per hour is not always fully appreciated by the enginemen and firemen running the locomotive. Usually their desire is to have as much steam as possible and little attention is given the safety valve. To find out just how much steam is wasted on a trip, and also to accurately show the engine crews the amount of money they waste by allowing the safety valves to blow, the device shown in the accompanying illustration was made.

It consists of a clock whose balance wheel is held in check while the engine is not blowing off. When the steam raises the valve



Recording Device for Safety Valves.

it also raises the arm extending over the valve, which, through a system of levers, removes the obstruction from the balance wheel of the clock allowing it to operate. The difference in the readings at the beginning and end of a run give the time the valve has been blowing-off. Forms are provided on which is recorded the engine number, the names of the engineer and firemen, and the readings of the clock at the beginning and end of the run. From the latter data the amount of coal wasted and its cost can readily be calculated. This report is turned in to the master mechanic's office, and if the waste is excessive the road foremen of engines makes an investigation.

The United States Geological Survey has published statistics on the recovery of copper, lead, zinc, tin and antimony from scrap metal, sweepings, etc., which show that the value of the metal thus recovered for 1910 was $44,150,000. The quantity of copper recovered was 51,000 tons; brass, 62,000 tons; lead, 55,323 tons; spelter or zinc, including alloys other than brass, 43,932 tons; tin and alloys, 13,903 tons, and antimony, 2,779 tons.

CAR DEPARTMENT AND PAINT SHOP KINKS.*

BY W. H. WOLFGANG,
Draftsman, Wheeling & Lake Erie, Toledo, O.

TIMBER TONGS.

A convenient timber tongs for handling lumber with a crane is shown in Fig. 1. It may be made of either wrought iron or

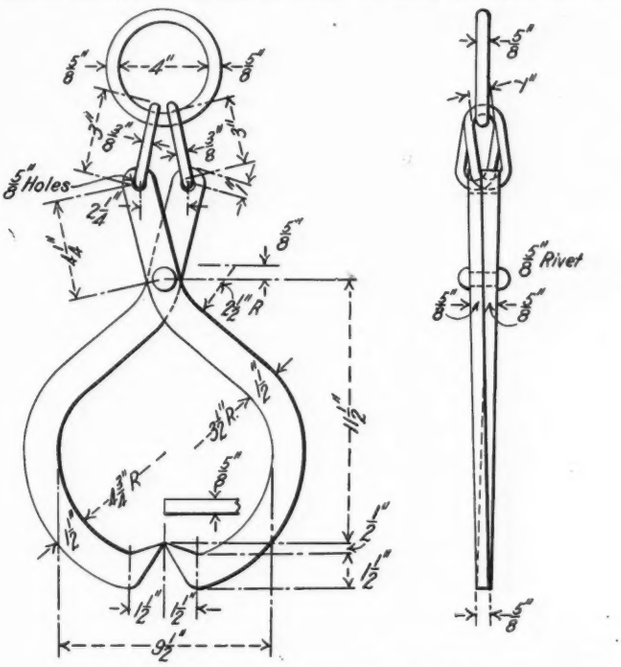


Fig. 1—Tongs for Handling Timber.

soft steel. Each half of the tongs is forged from a piece of ⅝ in. x 1½ in. stock.

TRESTLE FOR CAR REPAIRS.

A trestle for use in the car repair shop or yard should be rigid and substantial, with a large enough base for stability and

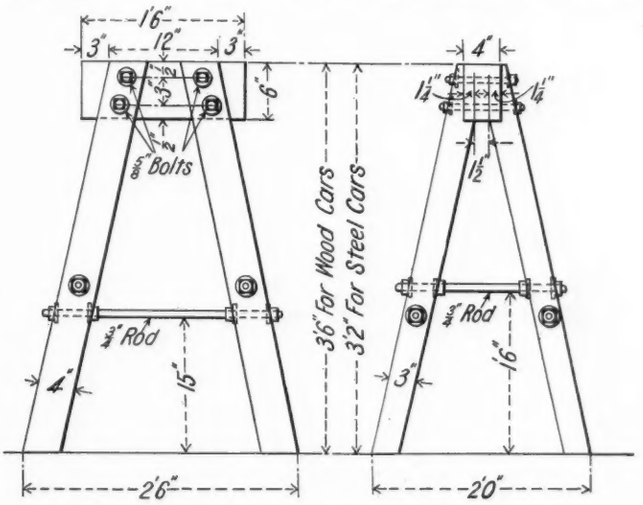


Fig. 2—Trestle for Use in Car Repair Shops and Yards.

yet arranged so that a truck can easily be taken out from under the car without interfering with it. Such a trestle, which has given good results and is not too heavy to be easily handled, is shown in Fig. 2. It has legs of 3 in. x 4 in. oak and a top cross piece 4 in. x 6 in. x 18 in. long. The legs are tied together by

*This collection of kinks was submitted in a competition which closed May 15, 1911. It is the second collection which has been submitted by Mr. Wolfgang, the first one having been published in the *Railway Age Gazette* of May 5, 1911, page 1068.

the ¾ in. rods. For use under steel freight cars the trestles are made 3 ft. 2 in. high and for wooden cars 3 ft. 6 in. high. The construction is very different from that of the trestle in use at the Delaware, Lackawanna & Western car shops at East Buffalo, as described in the *Railway Age Gazette* of June 3, 1910, page 1358, but it will undoubtedly give equally as good results, although it may not allow quite as much clearance between the lower part of the legs of the trestle and the truck.

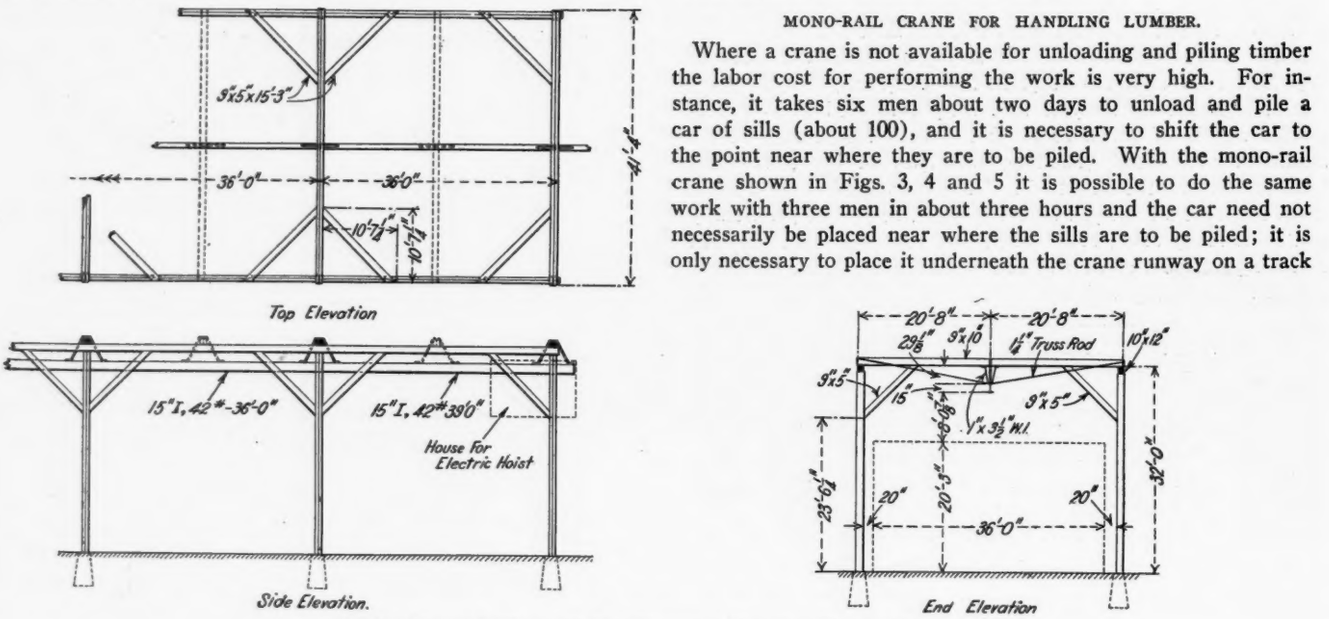


Fig. 3—General View of the Runway for the Mono-rail Crane.

MONO-RAIL CRANE FOR HANDLING LUMBER.

Where a crane is not available for unloading and piling timber the labor cost for performing the work is very high. For instance, it takes six men about two days to unload and pile a car of sills (about 100), and it is necessary to shift the car to the point near where they are to be piled. With the mono-rail crane shown in Figs. 3, 4 and 5 it is possible to do the same work with three men in about three hours and the car need not necessarily be placed near where the sills are to be piled; it is only necessary to place it underneath the crane runway on a track

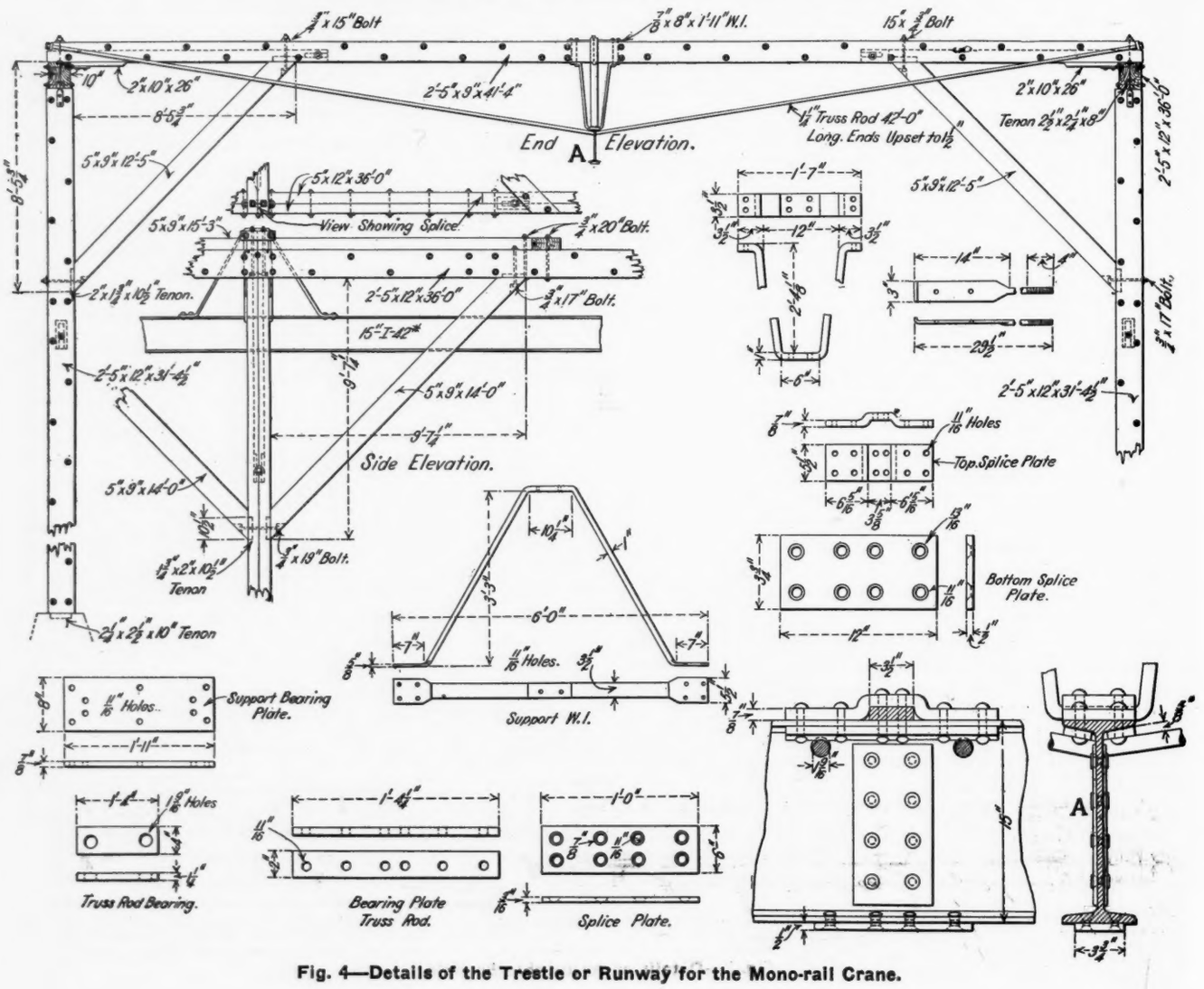


Fig. 4—Details of the Trestle or Runway for the Mono-rail Crane.

which is at right angles to it. The general arrangement of the trestle or crane runway supports is shown in Fig. 3, while the design of the details is shown in Fig. 4. The crane runway should extend the full length of the lumber yard and the uprights

Fig. 5—Application of the Hoist to the Mono-rail Crane.

which support it should be spaced far enough apart so that the longest sill will not strike them as it is being conveyed from one place to another. The photograph, Fig. 5, shows the application of the crane to the 15 in. I-beam *A*. The crane has a capacity of 2 tons and is electrically operated, the current being supplied by two wires which run parallel to the I-beam. The substantial way in which the I-beam is attached to the trestle is shown in the detail in the lower right hand corner of Fig. 4.

ADJUSTABLE SCAFFOLD FOR CAR AND PAINT SHOPS.

An adjustable scaffold is very necessary in a car repair shop or paint shop. Many varieties of such scaffolds will be found in the different shops, but many of them are cumbersome and hard to operate. The scaffold, which is shown in Figs. 6, 7 and 8, may be easily and quickly raised or lowered to any position by one man and without much exertion on his part. A considerable saving of time is thus possible, as compared to cases where two men are required for performing the operation. The 2½ in.

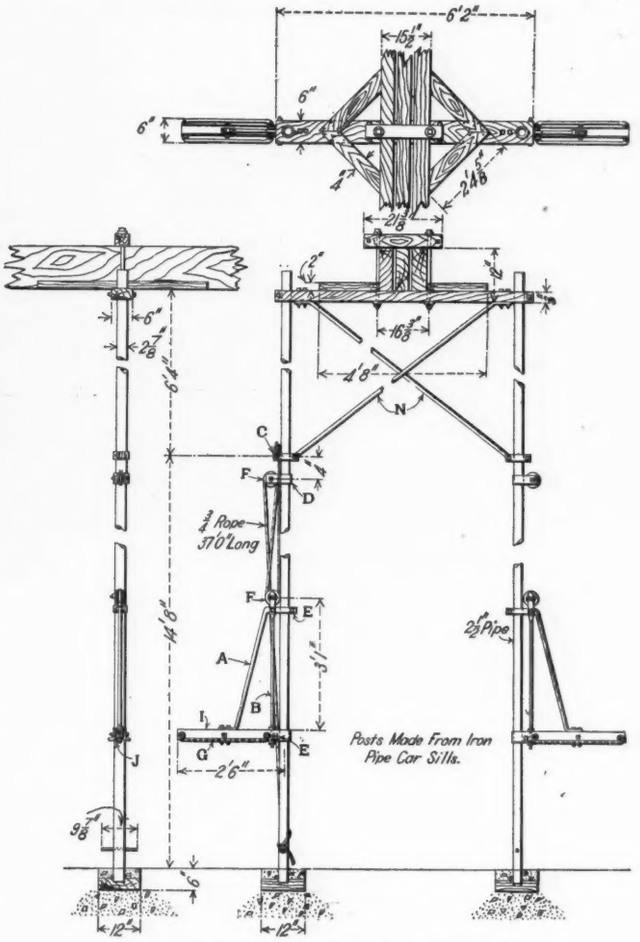


Fig. 6—Section of Adjustable Scaffold.

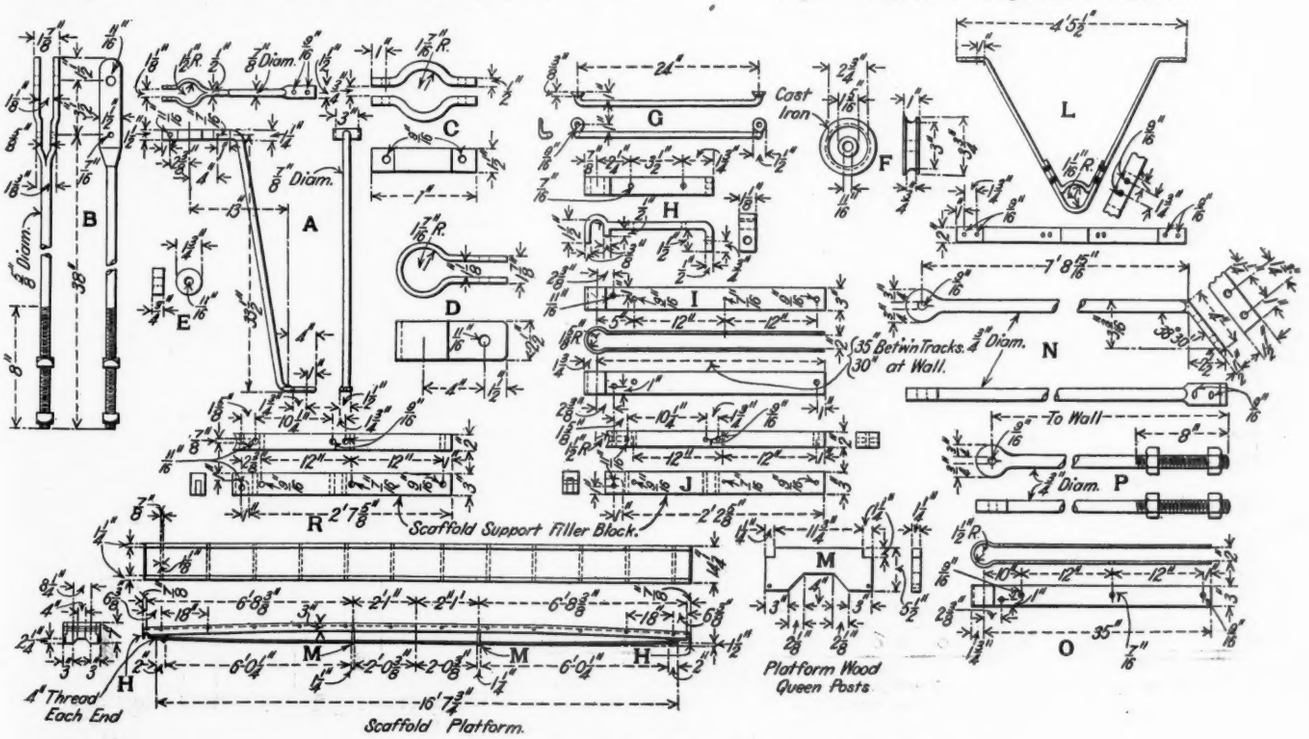


Fig. 7—Details of Adjustable Scaffold.

pipes that are used as uprights are anchored to the floor by wooden blocks set in concrete, as shown in Fig. 6. The tops of the uprights are rigidly secured to the roof trusses and are braced with the ¾ in. iron rods *N*, as shown. Where the scaffold is close to the wall, brace *L* (Fig. 7) should be used for securing the upper part of the upright to it, instead of to the roof truss. A ¾ in. manila rope is used for raising and lowering the platform. This is secured to the upright near its upper end at *C* and passes around the pulleys *F*, as shown; when the platform has been adjusted to the proper height the rope is secured to the ½ in. pin near the bottom of the upright.

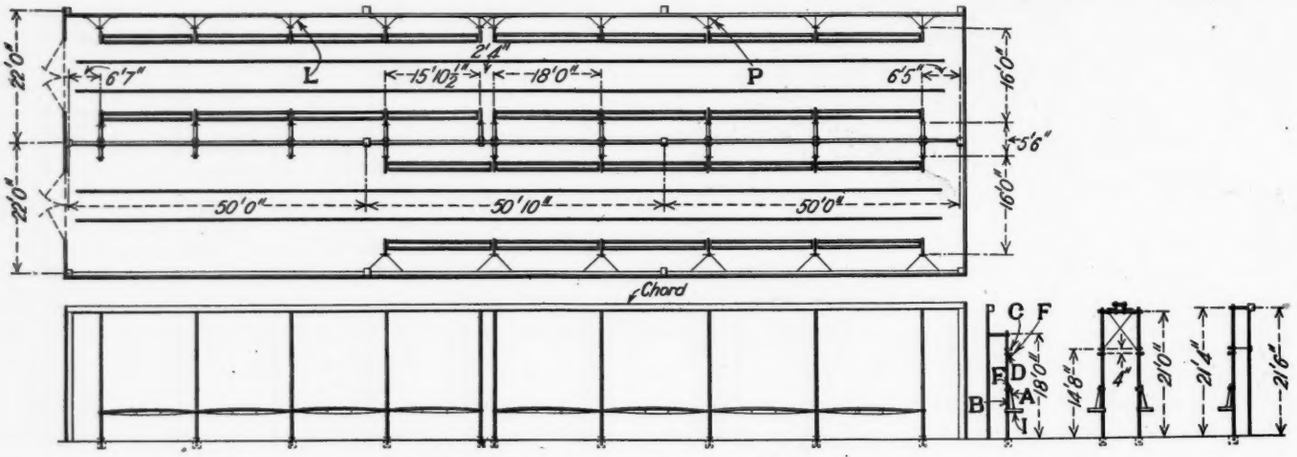


Fig. 8—General Arrangement of Adjustable Scaffold.

The framework of the scaffold platform is similar to an ordinary ladder, as shown in Fig. 7, and is covered with ¾ in. flooring. It is stiffened by the ½ in. truss rods on the underside. Platforms more than 20 ft. in length are liable to warp or twist out of shape and ordinarily should not exceed that length. To raise or lower the platform it is only necessary to loosen the manila rope at its lower end and to refasten it after the platform has been adjusted. This operation requires only a small amount of time. The best results may, of course, be obtained by having each platform supplied with its own posts or uprights, instead of having a common upright and bracket for the adjacent ends of two platforms. In the former case the platforms can be operated independently, making it a little more convenient for certain classes of work.

This scaffold is quite different from any of those which have thus far been described in the *Railway Age Gazette*, including the ones in the Elizabethport coach shop of the Central Railroad of New Jersey, April 1, 1910, page 875; in the Sayre coach shop of the Lehigh Valley, December 2, 1910, page 1062; or the Morris

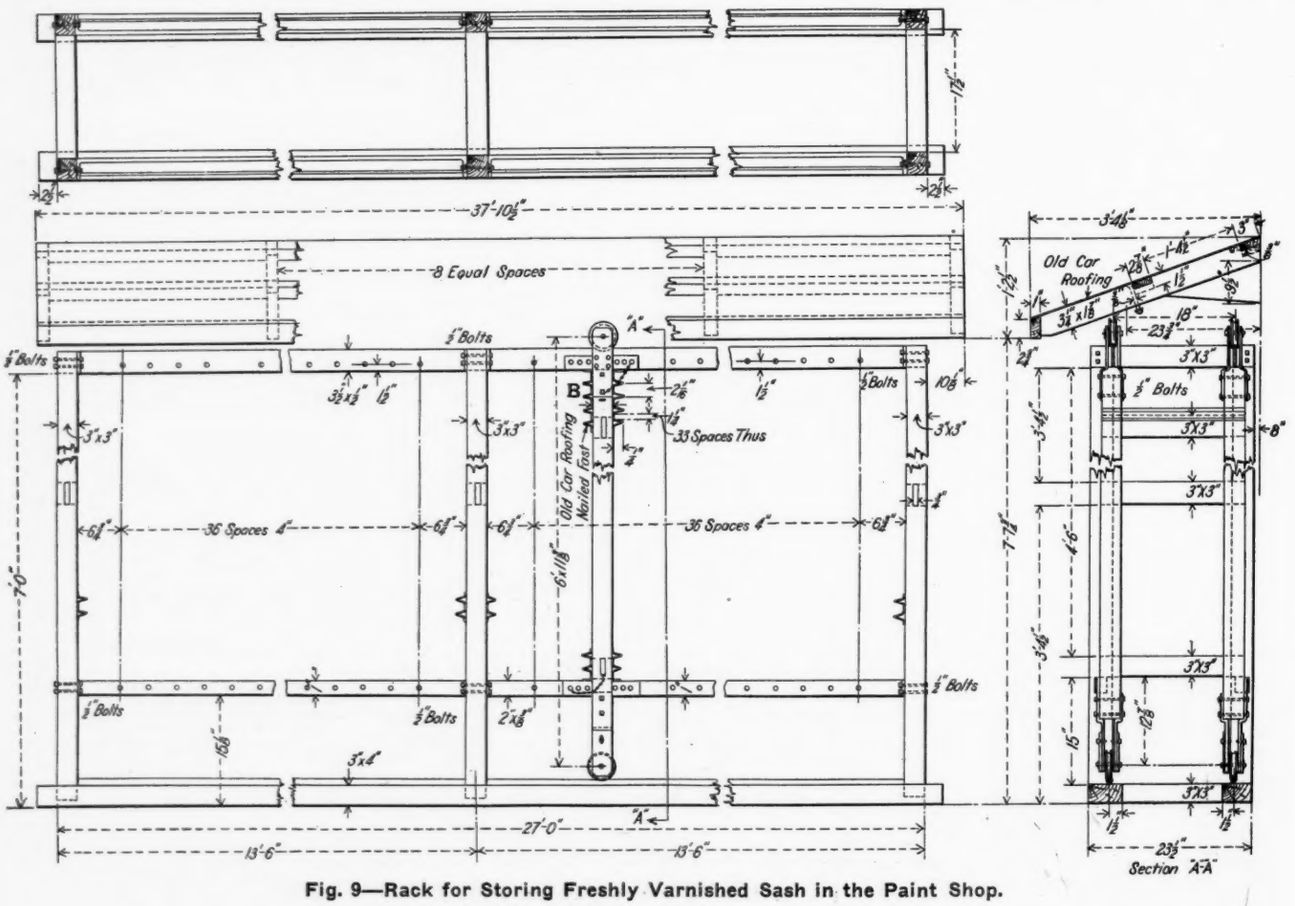


Fig. 9—Rack for Storing Freshly Varnished Sash in the Paint Shop.

Park coach shop of the Long Island, November 4, 1910, page 866. Both the Central of New Jersey and the Lehigh Valley scaffolds have wooden uprights, while the Long Island scaffold operates on strips of ¾ in. x 4 in. iron, which are bolted to the wooden posts or columns.

ADJUSTABLE SASH RACK.

A convenient and adjustable sash rack for storing passenger car sash after it has been varnished is comparatively easy to devise, and it is strange that so many inconvenient arrangements for this purpose are to be found in railway paint shops. The one shown in Figs. 9 and 10 is of simple construction and may easily be adjusted. The frame-work may be made from old car sills. Each movable section of the rack has two wheels at the top and two at the bottom. The lower wheels operate on the ⅝ in. round iron rails that are fastened to the wooden timbers, which form the base of the rack, by No. 1⅔ in. wood screws. The wheels at the top operate on the 3½ in. x ½ in. iron bars. In case the wheels or the rail become worn the height of the rack may be adjusted vertically to distribute the load on the four wheels properly by means of the set screws and the iron plates *A* at the lower ends of the vertical members of the rack. When the movable part of the rack has been properly adjusted to receive the sash, it is held in place by passing a ⅜ in. pin through the plate near the bottom and a 2 in. x ⅜ in. horizontal plate about a foot from the bottom of the rack, and also by passing a similar pin through one of the holes in the top plate and the rail on which the rack operates. The tin slides (*B*) on which the sashes rest are made from old car roofing and are nailed fast to the racks. If the rack is placed near the wall of the shop a roof or top may be built over it, as shown in Fig. 9, thus preventing the dust and dirt from falling on the sash. Usually there are springs on the sash, but the tin slides, having no projections on them for the springs to catch in, allow the sash to slide easily into place.

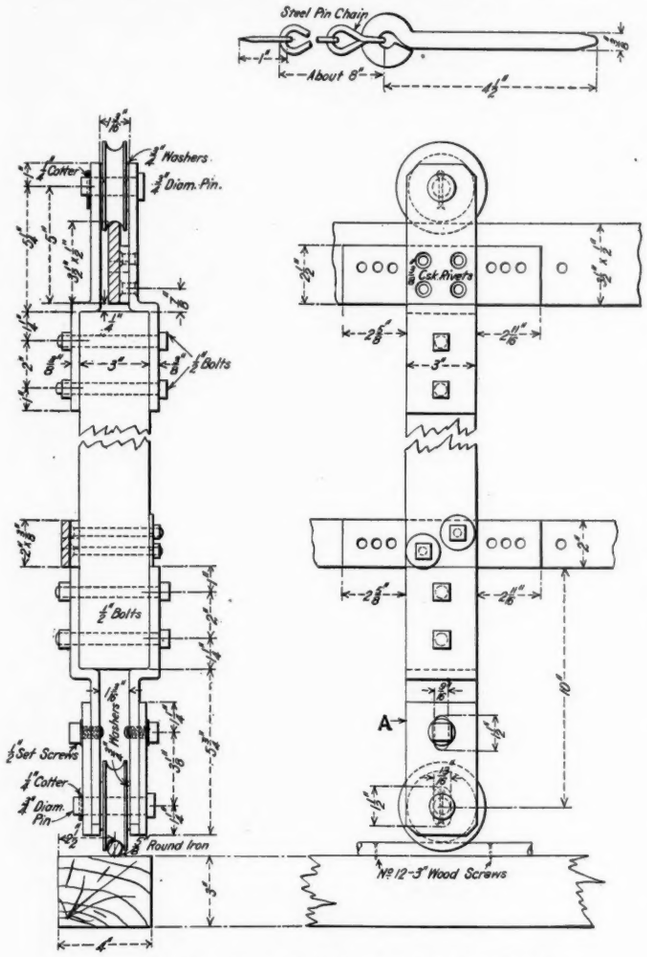


Fig. 10—Details of Adjustable Sash Rack.

TRUCK FOR HANDLING AXLES.

With the truck shown in Fig. 11 one man can handle and transport the heaviest car axles without over-exerting himself. The truck is pushed over the axle and the slip ring *A*, which can easily be moved along the rod, is slipped over the journal at one end of the axle. The other end of the axle is gripped by the tongs, which are operated by the lever *B* near the handle of the truck. The wheels of the truck are of large diameter and are fitted with steel hubs and tires and wooden spokes and rims. The other parts of the truck may be easily forged of wrought iron. A truck for this purpose, constructed largely of 1½ in. iron pipe and used on the Atchison, Topeka & Santa Fe, was described by E. J. McKernan in the *Railway Age Gazette* of March 4, 1910, page 495.

TRUCK FOR HANDLING MOUNTED WHEELS.

The truck for handling mounted wheels shown in Fig. 12 is quite similar to the one which was described in the *Railway Age Gazette* of January 7, 1910, page 33, by F. C. Pickard, master mechanic, Cincinnati, Hamilton & Dayton, Indianapolis, Ind., except that it is possibly simpler in construction and cheaper to make than the one proposed by Mr. Pickard. It has an advantage over the one used by the Delaware, Lackawanna & Western at East Buffalo, N. Y., *Railway Age Gazette,* June 3, 1910, page 1359, in that it provides a means for swiveling the wheels, thus making it easier to transport the truck about the yard. As is the case with the two above mentioned types of truck, it is necessary to use one at each end of the axle. It is

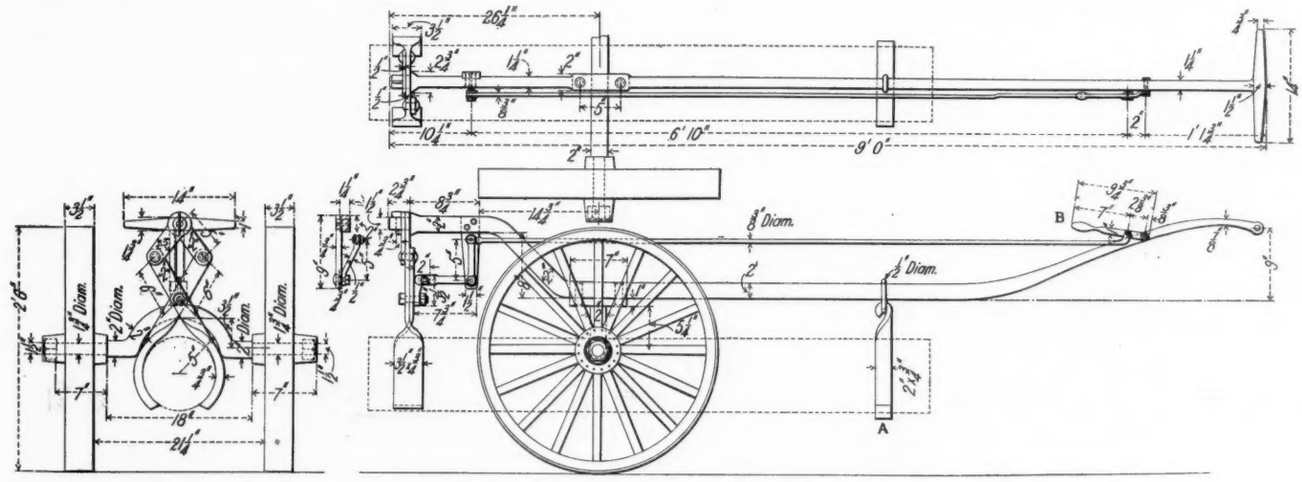


Fig. 11—Truck for Handling Axles.

only necessary to raise the handle of the truck and push the fork directly under the journal and then to bear down on the handles of both trucks until the mounted wheels are lifted clear of the floor. With one man pulling and the other pushing, the wheels may be easily transported about the yard. The truck wheels are 14 in. in diameter with 3 in. treads and may be made of either cast or malleable iron. The axle may be forged from old car axles.

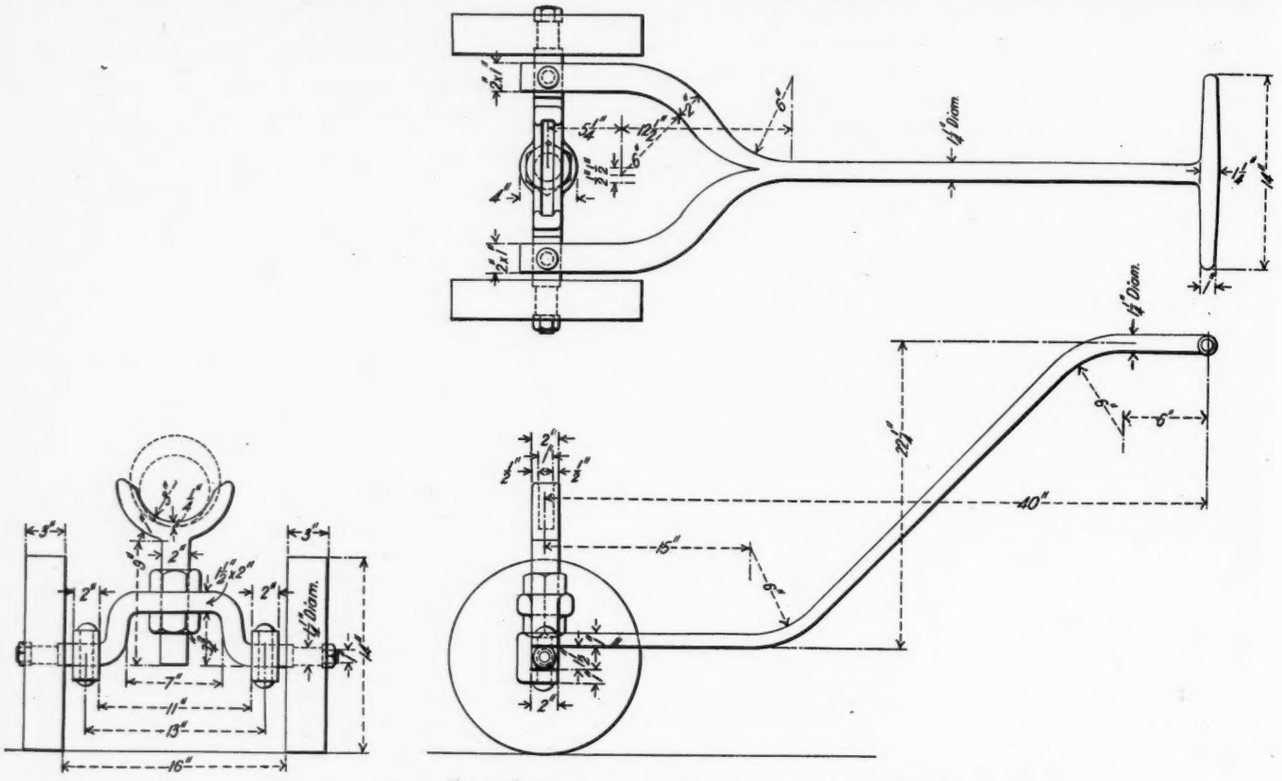


Fig. 12—One of a Pair of Trucks for Handling Mounted Car Wheels.

PORTABLE RIVET HEATER.

A portable rivet heater, which is made largely of second-hand material, is shown in Figs. 13 and 14. The oil tank, which also forms the base of the heater, is an old Westinghouse reservoir, bolted to the truck frame and furnace, as shown. The furnace is lined with fire brick, the top being bolted on so that it may easily be removed and the fire brick replaced, when necessary. The piping and other fittings were made of second-hand material.

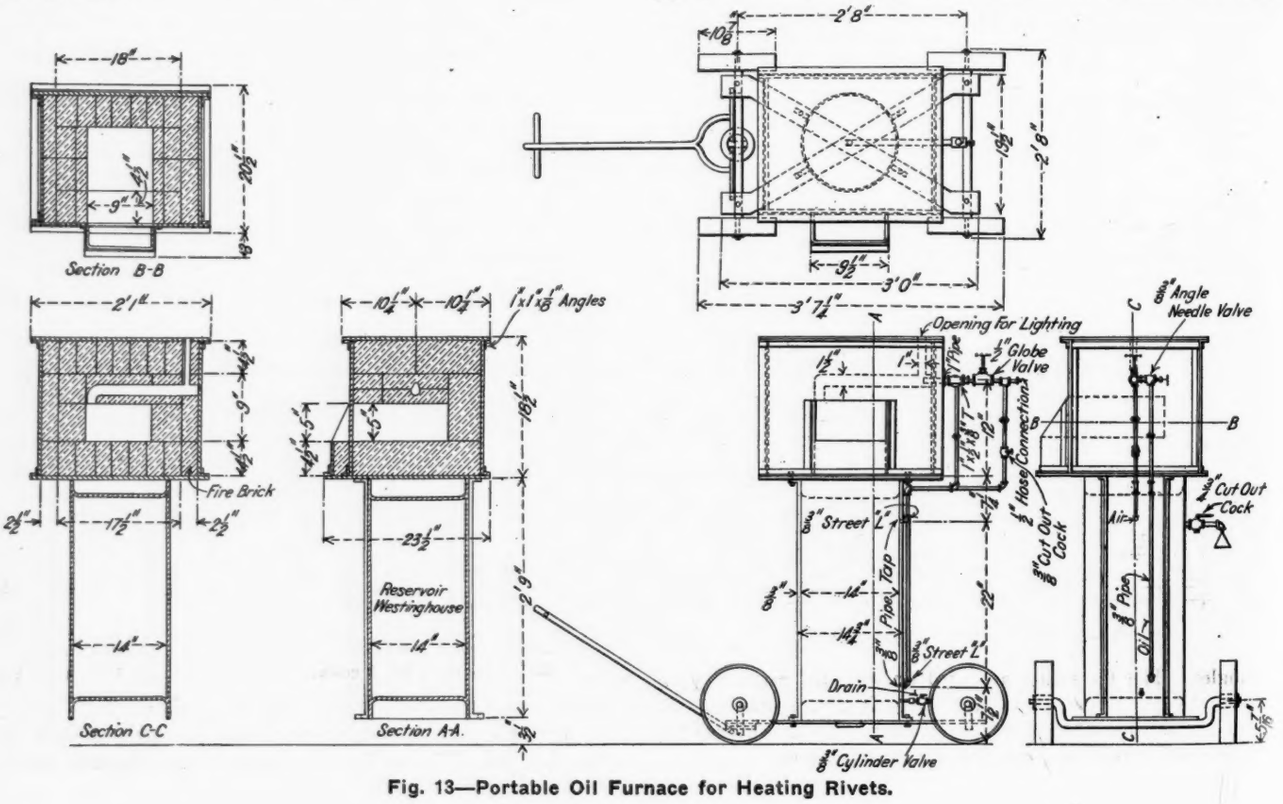


Fig. 13—Portable Oil Furnace for Heating Rivets.

The arrangement of the air connections is clearly shown. By opening the ⅜ in. cut-out cock air is admitted to the oil tank. The oil is thus forced up into the mixing chamber, the flow being controlled by the ⅜ in. needle valve. By adjusting this and the ½ in. globe valve, which controls the air supply to the mixing chamber, perfect combustion may be obtained. After the furnace becomes heated very little fuel is required to keep the temperature at a high point. The general construction of the furnace is

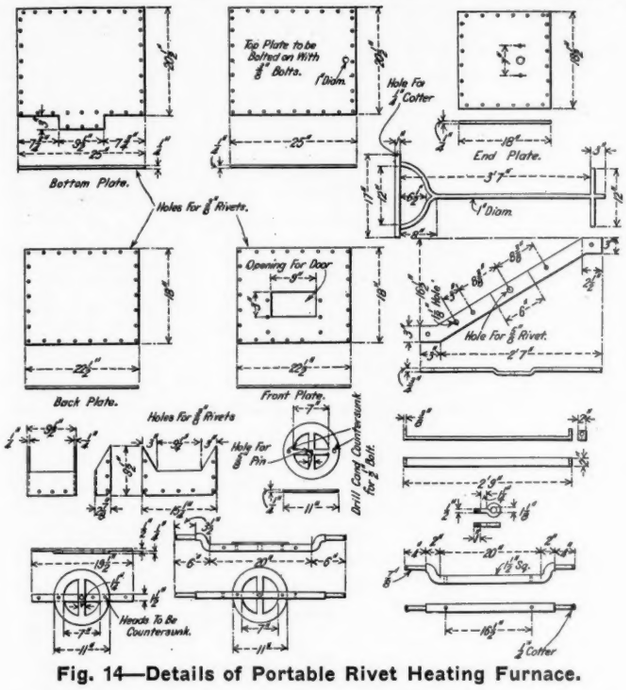


Fig. 14—Details of Portable Rivet Heating Furnace.

shown in Fig. 13 and the details of the various parts in Fig. 14. I believe that thus far no oil rivet heating furnace has been described in the *Railway Age Gazette*.. The furnace described by W. H. Snyder, assistant general foreman, New York, Susquehanna & Western, in the *Railway Age Gazette* of January 6, 1911, page 21, and the one used in the New York Central & Hudson River car shops at East Buffalo, as described in the issue of August 5, 1910, page 234, both use coal.

WORK BENCH FOR DRILL PRESS OPERATORS.

A convenient work bench for the use of drill press operators in a machine shop is shown in Fig. 15. To keep the top, which measures 2 ft. x 4 ft. 6 in., in good condition, it is covered with a ¼ in. iron plate. The 3 in. timbers underneath this plate are securely fastened to the substantial framework by ⅜ in. x 1½

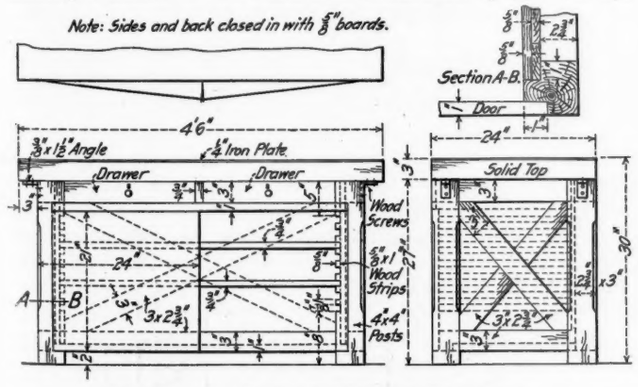


Fig. 15—Bench for Drill Press Operators.

in. angles. The tools that are used on the drill press may be kept in the two drawers and such templets as are used may be stored on the adjustable shelves underneath. The bench does not take up much room; its construction is clearly shown.

STEEL PAINT TESTS.

Three years ago the Paint Manufacturers' Association of the United States provided 500 steel plates, 24 in. x 36 in. x ⅛ in., which were covered with different paints and exposed to the atmosphere on fences erected at Atlantic City, N. J. These test panels have been inspected from time to time by a committee of the American Society for Testing Materials, and have created considerable interest, since the life of any steel structure or equipment depends in a large measure upon the way in which it is protected from the corroding effects of the atmosphere.

A second inspection of these panels was made on Wednesday, June 28, 1911, by sub-committee D of Committee D-1 of the American Society for Testing Materials, who reported on the condition of the painted surfaces, leaving the report of the comparative corrosion of the various types of metal used in the tests to committee A-5 on the corrosion of iron and steel. Ratings were given each panel according to the amount of rust apparent on the painted surfaces of the panels, as well as the degree of checking, chalking, scaling, cracking, peeling, loss of color, and other signs of paint failure shown. The system of rating, which took into consideration all of the above conditions, was similar to the system used at the first inspection during 1910, when zero recorded the worst results and 10 the best results. In Table 1 is shown the rating accorded by each inspector to each panel, as well as an average for each panel.

TABLE 1.—SECOND INSPECTION OF PAINT-TEST STEEL PANELS.

Panel.	Pigment.	W. H. Walker.	P. H. Walker.	Gardner, *Chairman.*	Chapman.	Average.
1	Dutch process white lead	2	3	3	5	3.7
2	Quick process white lead	4	4	3	6	4.2
3	Zinc oxide (xx)	1	1.5	1	2.5	1.5
4	Sublimed white lead	9	9.5	9	8.5	9.0
5	Sublimed blue lead	9	9.5	9.5	7.5	8.8
6	Lithopone	2	1.5	2	3.5	2.2
7	Zinc white lead	3	4	5	7	4.7
9	Orange mineral (American)	9	9	9	6.5	8.3
10	Red lead	9	9	9	6.5	8.3
12	Bright red oxide	8.5	9	8	7	8.1
14	Venetian red	7	9	7	9	8.0
15	Prince metallic brown	5	7.5	6	8	6.3
16	Natural graphite	6	8	4	9.5	6.8
17	Artificial graphite	5	7.5	4	7	5.9
19	Lamp black	5	7.5	5	8	6.3
20	Willow charcoal	9	8.5	9	9	8.8
21	Carbon black (gas)	7	8.5	5	8.5	7.2
24	Yellow ochre (French)	5	7	2	8	5.5
27	Barytes (natural)	1	1	1	0	0.7
28	Barytes (precipitated)	2	1.5	2	2	1.8
29	Calcium carbonate (whiting)	0	0	0	0	0.0
30	Calcium carbonate (precipitated)	0	0	0	0	0.0
31	Calcium sulphate (gypsum)	1	1	2	3	1.7
32	China clay (kaolin)	6	6	7	6.5	6.3
33	Abestine (magnesium silicate)	5	4.5	6	5	5.1
34	American vermilion (chrome scarlet)	10	10	10	10	10.0
36	Lead chromate	7	7.5	8.5	8	7.7
39	Zinc chromate	9	9.5	10	9.5	9.5
40	Zinc and barium chromate	9	9.5	10	9.5	9.5
41	Chrome green (blue tone)	10	10	10	9.5	9.8
44	Prussian blue (water stimulative)	9	9.5	8.5	9	9.0
45	Prussian blue (water inhibitive)	8	9.5	8	8.5	8.5
48	Ultramarine blue	0	0	0	0	0.0
49	Zinc and lead chromate	10	9.5	10	9.5	9.7
51	Magnetic black oxide	9	9.5	10	9.5	9.5
111	Brown (composite paint)	7	9	9	9	8.5
222	Black (composite paint)	9	9	9	8.5	8.8
333	White (composite paint)	4	4	7	3	4.5
444	Green (composite paint)	5	7	7	8	6.7
555	Black (composite paint)	9	9	6	9	8.2
666	Brown (composite paint)	8	8	6	9	7.7
777	White (composite paint)	7	10	5	7	7.2
888	Green (composite paint)	7	8	8	9	8.0
2000	1 coat zinc chromate, 1 coat iron oxide excluder	8	8.5	8	8	8.1
3000	1 coat lead chromate, 1 coat iron oxide excluder	7	8	7	7.5	7.3
4000	1 coat red lead, 1 coat iron oxide excluder	7	8.5	8	7.5	7.7
100	Straight carbon black paint with turps and drier	5	8.5	4	8.5	6.5
90	Straight lamp black paint with turps and drier	5	7	3	8	5.7
5555	Coal tar paint (over red lead)	4	8	2	7	5.2
1000	Chrome resinate in oil, 1 coat	1	0	0	2	0.7
1 (plate)	Boiled (linseed) oil, 3 coats	1	0	1	4	1.5

Panels 111, 222, 333 and 444 are covered with composite paints made from pigments that were inhibitive in the water test, and the panels 555, 666, 777, and 888 are covered with composite paints

made from pigments that were stimulative in the water test. All the pigments shown in Table 1 were ground in two-thirds of a gallon of raw linseed oil, and one-third of a gallon of boiled linseed oil, without regard to consistency. The plates to which the pigments 1 to 51 inclusive were applied were pickled in sulphuric acid, then neutralized with soda ash, and after being thoroughly washed were preserved from future oxidation in dry lime until needed for the test. The paint was applied by painters representing the committee and the Master Painters' Association, three coats being applied on the cleaned plates.

Table 2 shows the rating of those panels which were considered by the sub-committee as meriting the rating of from 8 to 10 and as having given the best all-round service.

Table 2.—Analysis of Averages. Grade of Excellence from 8 to 10.

Panel.	Pigment.	Wt. of Pigment per gal. of oil-lbs.	Sp. Gr. of Paint as received.	Grams of Paint to the Panel.	Average.
34	American vermilion (chrome scarlet)..	20.49	....	64.5	10.0
41	Chrome green (blue tone).....	13.32	1.94	49.0	9.8
49	Zinc and lead chromate.....	14.28	1.92	48.3	9.7
39	Zinc chromate	10.71	1.75	39.2	9.5
40	Zinc and barium chromate.....	10.35	1.58	40.	9.5
51	Magnetic black oxide	15.	1.92	48.3	9.5
4	Sublimed white lead.....	19.17	2.36	59.	9.0
44	Prussian blue (water stimulative).....	5.88	....	30.	9.0
5	Sublimed blue lead.....	19.17	2.42	61.	8.8
20	Willow charcoal	4.47	1.08	27.0	8.8
222	Black (composite paint).....	10.86	1.30	32.8	8.8
45	Prussian blue (water inhibitive).....	5.79	....	*34.5	8.5
111	Brown (composite paint).....	10.82	1.30	32.7	8.5
9	Orange mineral (American).....	26.91	2.97	74.7	8.3
10	Red lead	26.10	2.93	73.6	8.3
555	Black (composite paint).....	9.37	1.125	28.0	8.2
12	Bright red oxide	15.78	2.05	†60.0	8.1
2000	1 coat zinc chromate, 1 coat iron oxide excluder	.....	....	....	8.1
14	Venetian red	9.30	1.52	38.0	8.0
888	Green (composite paint).....	14.57	1.75	44.0	8.0

*29.5 + 5 (1,000 grams paste required 163 grams turpentine).
†51.5 + 8.5 (1,000 grams paste required 166 grams turpentine).

All the paints were applied at the spreading rate of 900 sq. ft. per gal., and two of the pigments in Table 2 had to be thinned with turpentine, as shown by the foot notes, before being applied. A description of the pigments shown in Table 2 follows:

American Vermilion:—This was made by boiling white lead and chromate of soda, to which was added a small quantity of sulphuric acid in order to brighten the shade. This color consists of basic chromate of lead in large crystallized form. It is liable to contain free chromate, small quantities of white lead and sulphate of lead, also small quantities of sulphate of soda.

Chrome Green, Blue Tone:—This was made from nitrate of lead, bichromate of soda and oil of vitriol, precipitated on white lead and Chinese blue. Besides chromate of lead, the resultant product contains sulphate of lead, Chinese blue, and white lead. It it also liable to contain nitrate of lead salts and nitrate of soda.

Zinc and Lead Chromate:—This was made from zinc and lead acetates and chromate of soda. It contains small quantities of zinc and lead acetates, chromates and acetate of soda.

Zinc Chromate:—This was made from a zinc salt and bichromate of potash. Owing to its solubility, it is impossible to be washed perfectly and, therefore, it usually contains a considerable amount of soluble matter, sulphate of potash, chromate and zinc oxide.

Zinc and Barium Chromate:—This was made by precipitating a mixture of zinc chloride and barium chloride with chromate of soda. The product contains considerable soluble matter, consisting of zinc chloride, barium chloride, sodium chloride and chromates.

Magnetic Black Oxide:—This was made by neutralizing acid ferrous sulphate liquors with an alkali and blowing air through the mixture.

Sublimed White Lead:—This was sublimed from Missouri lead ores.

Prussian Blue (water stimulative):—This is a Chinese blue, made from prussiate of potash and copperas and was oxidized with chloride of lime.

Sublimed Blue Lead:—This was made by burning coarsely broken galena mixed in a furnace with bituminous coal. The fumes were drawn from the furnace and purified. Its color is due to the carbon and lead sulphide.

Willow Charcoal:—This was made from calcination of willow branches.

Black (composite paint):—This paint is made up of 13.72 per cent. bone black, .92 per cent. Prussian blue, 4.57 per cent. zinc, 22.86 per cent. silex, 3.66 per cent. calcium carbonate, 8.33 per cent. japan and 45.94 per cent. raw oil

Prussian Blue (water inhibitive):—This is a Prussian blue made from prussiate of potash and copperas. It was oxidized with bichromate of potash. It contains a certain amount of chromate to which its water inhibitive qualities are probably due.

Brown (composite paint):—This paint is made up of 22.5 per cent. of burnt umber, 7.5 per cent. of zinc and barium chromates, 7.5 per cent. zinc lead, 3.4 per cent. japan and 5.91 per cent. raw oil.

Orange Mineral (American):—This was made from white lead by the usual method.

Red Lead:—This was made by oxidizing litharge in reverberatory furnaces.

Black (composite paint:)—This paint is made up of 8.18 per cent. lamp black, 8.18 per cent. natural graphite, 4.09 per cent. barytes, 8.33 per cent. japan and 71.22 per cent. raw oil.

Bright Red Oxide:—This is 98 per cent. oxide of iron (copperas red).

Venetian Red:—This was made by calcining a mixture of copperas and terre alba.

Green (composite paint):—This is made up of 4.32 per cent. Chinese blue S, 18.94 per cent. lemon chrome yellow, 16.23 per cent. sublimed white lead, 21.35 per cent. barytes, 2.35 per cent japan and 38.51 per cent. raw oil.

The full details of the tests, as well as an outline of former reports, is contained in the report of the first inspection, which is included in the report of committee A-5 in the 1910 Proceedings of the American Society for Testing Materials, page 73.

SHOP FLOORS.

In a paper on Factory Construction and Arrangement, presented before the New York meeting of the American Society of Mechanical Engineers, October 9, 1911, by L. P. Alford and H. C. Farrell, in which the arrangement and construction of the reinforced concrete buildings of the United Shoe Machinery Company at Beverly, Mass., were described, the concrete floors were discussed as follows:

"When these buildings were developed, the use of reinforced concrete as a material of construction was new and much of the work that was done had no foundation in precedent. The authors can recall with some amusement discussions over points considered of major importance, for which an easy solution was later found. One of these was the floors. A lengthy discussion took place as to whether or not a concrete floor was suitable for machine-shop purposes. It was finally determined that concrete floors should be used with the single exception of the stair treads, which were to be of wood. These concrete floors have been found to be so satisfactory that they were continued in the additions of 1906-1907, and will be used in the additions now in progress.

"One of the arguments against a concrete floor upon which persons must work is its hardness, but our experience shows this to be unfounded. The real objection to a concrete floor lies in its coldness. Concrete is a much better conductor of heat than wood, and for that reason, a cold concrete floor will rapidly withdraw bodily heat from the feet of anyone standing on it. Therefore, the only floors which need special attention are those which are in contact with the ground. The lower floors of these buildings are of concrete some 12 in. thick, and between the under floor and the upper floor are three thicknesses of waterproofing felt mopped in with asphalt. When the employees were transferred from the old factories with wooden floors to the new, some complaints were heard for the first few weeks, or until the men had become accustomed to the change. Thereafter, there has been no difficulty except on the part of a new man, who has to go through his own period of becoming wonted to the new conditions. Further objections raised to the use of these floors were those of wear due to the grinding action of the wheels of trucks, the chipping action of the ends of pinch bars used for moving heavy machines, the scouring action of metal boxes dragged over it, and, by far the most important, the difficulty of making floor repairs. On the first floor of one building, a floor devoted to the heaviest work done in the plant, requiring the largest machine tools and receiving the largest and heaviest castings, the floor of the center bay has been refinished by adding 1½ in. of a one-to-two granolithic mixture. This, of course, covers the area that has received the greatest amount of wear, as in all of the buildings a central passageway 8 ft. wide was left between the machine tools and other permanent fixtures.

"The greatest difficulty in maintaining these floors has been found to lie in the making of minor repairs, namely, those

necessitated by the crumbling away of the edges of the grooves with which the original floors were marked out, or the edges of cracks and repairs to small depressions caused by the wearing away of soft spots in the surface. Repairs made with any cement mixture have been uniformly unsuccessful, provided the area repaired was comparatively small. At present, such repairs are being made by using an asphalt mixture which is applied to the surface in a plastic condition and then bonded to the concrete by the application of heat from gasoline blow torches. This method is much more successful than the use of cement mixture, although it does not entirely prevent the crumbling of the edge of the concrete where the concrete and asphalt join. It was also feared that the oil required in an automatic screw machine department would penetrate the concrete and tend to disintegrate it, but it has been proved that this fear was unfounded. Repeated investigations throughout the past six years have failed to show that there is penetration through the glaze of the finish even in departments where the floor is constantly wet with oil. Where cracks are present the oil will find an entrance; its penetration beyond the limits of the crack is very little, and is not the cause of any apprehension whatever. With regard to the possible injury from dust due to wear on the floors, there is no reason to believe that there has been any greater wear on the moving and sliding members of the machine tools than would have been the case in any other type of building."

SHOP KINKS.*

BY H. L. BURRHUS,
Assistant to General Foreman, Erie Railroad, Susquehanna, Pa.

CUTTING OFF AND SQUARING STAYBOLTS.

The dies shown in Fig. 1 are used for cutting off and at the same time squaring two sides of the end of a staybolt. They are used in a shear, such as is ordinarily used for cutting bar

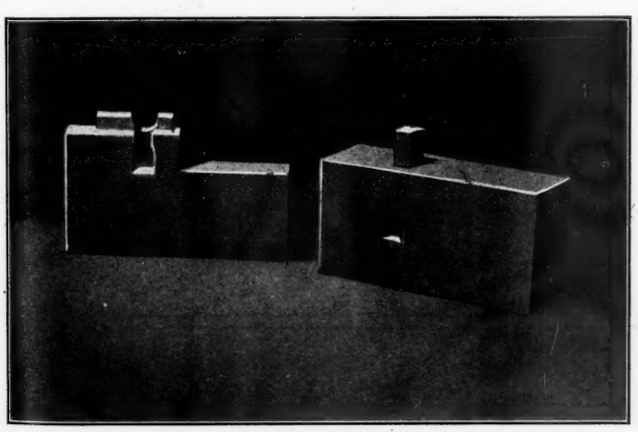


Fig. 1—Dies for Forming Square Ends on Staybolts.

iron; the staybolt iron is not heated. The projecting part in the die at the right, which is the bottom one, acts as a shear blade in cutting the iron off and at the same time assists in shearing the two sides of the end of the bolt. This projecting part or blade is removable, as shown in Fig. 2. This view also shows how the cutter blade is applied to the left hand or top die. It is this blade acting in conjunction with the one on the other die which cuts off the staybolt. Before the bolt has been entirely sheared off the projecting part on the right hand die starts to force the staybolt iron into the cavity in the left hand die, thus cutting off the material on the two sides of the bolt. The wearing parts of the dies may easily be replaced when they have become worn or are broken. The cutter in the right hand die is 13/16 in. x 1⅛ in. in section, thus making the flattened portion on the end of the staybolt of the same longitudinal section. The half round hole in the side of the right hand die is used for removing the cutter. When the cutter becomes too short because of wear and resharpening, a wedge can be driven in through the round hole and under the end of the die, thus raising it to the proper height. By using a special socket in the air motor it is only

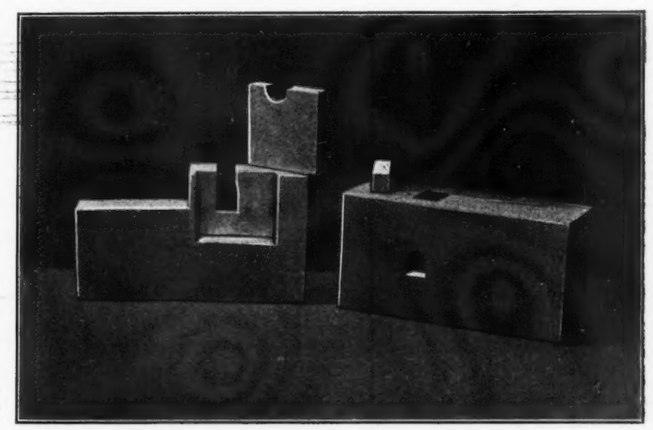


Fig. 2—Another View of the Dies for Forming Square Ends on Staybolts.

necessary to shear the staybolt ends off on two sides; if it is desired to make a square head the bolt will have to be turned 90 deg., allowing the dies to shear off the other two sides at right angles to the first two.

AIR MOTOR TESTING MACHINE.

Good tools are as important as kinks, and means should be provided to test the air motors to be sure that they are kept in good condition and operate at maximum capacity. The machine shown in Fig. 3 has been devised for this purpose. The motor is applied to a shank on the end of the shaft and is kept from turning by the arm *A*. The number of revolutions at which the motor operates is governed by tightening

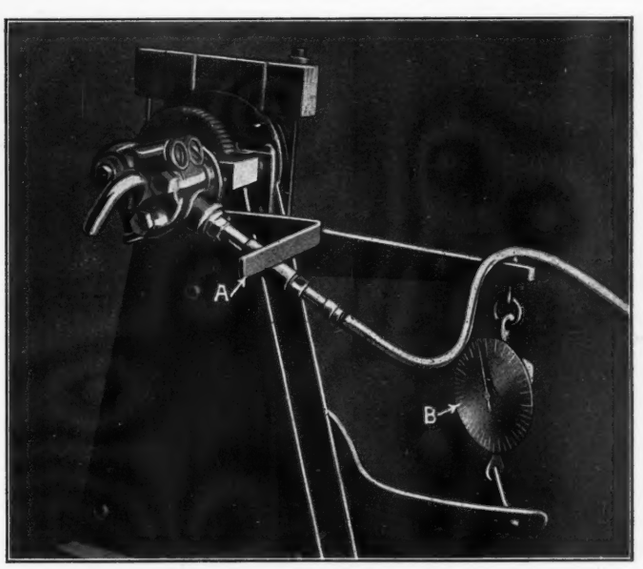


Fig. 3—Machine for Testing Air Motors.

the prony brake and the pull is measured by the scale *B*, which is attached at its upper end to the arm of the prony brake, and at its lower end to an arm which is riveted to the base

*This collection of kinks was submitted in the competition which closed May 15, 1911. Mr. Burrhus entered a collection of shop kinks in the competition which closed January 15, 1911, the collection appearing in the issue of March 3, 1911, page 406. He was also awarded second prize in the competition on engine house kinks, which closed on March 15, 1911, the kinks appearing in the issue of May 5, 1911, page 1049.

of the machine, or it may be fastened directly to the floor. When a new motor is received it is tested and a record is kept of the pull on the scale for each of the different speeds at which it is operated. When there is any question as to the results which a motor is giving in service it is placed on the testing machine to see how it compares with its original condition. It is also tested whenever repairs are made.

The body or sides of the testing machine are made of ⅜ in. boiler steel plates flanged at the bottom so that they can

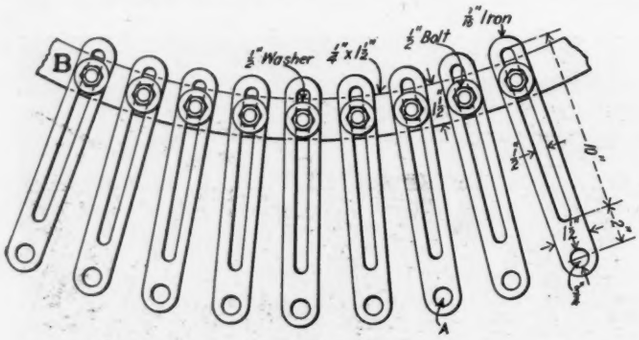


Fig. 4—Jig for Laying Out Smokebox Fronts.

be bolted to the floor. The bearings for the two shafts are pressed into drilled holes near the tops of the sides. The motor fits on the shank at the end of one of the shafts, which is connected by gearing to a second shaft that has the prony brake wheel mounted on its outer end. The plates are only placed far enough apart to clear the two gears. The machine is 30 in. high and is 18 in. long and 6 in. wide at the base.

LAYING OUT SMOKEBOX FRONTS.

A portion of a jig for laying out smokebox fronts to fit the studs or bolts in the smokebox ring is shown in Fig. 8. The frame *B* should be made a true circle. The number of fingers or gages must, of course, be governed by the greatest number of studs or bolts in the smokebox rings of the locomotives on the road where the jig is to be used. The 10 in. slot in each finger allows an adjustment of 20 in. in diameter. The diameter of the frame will, of course, depend on the range of diameters of the smokeboxes. The jig is applied to the smokebox ring by fitting the holes *A* in each finger over the studs or bolts. When adjusted the fingers are tightened to the frame by the ½ in. bolts. After all the fingers have been tightened the jig can be removed and placed on the smokebox front, making it possible to scribe all the holes accurately. The fingers may be adjusted to suit any variation in the ring, so that after the front is laid out and drilled it should fit perfectly. The frame is made of ¼ in. x 1½ in. iron and the fingers are made of 1/16 in. iron, 1½ in. wide.

TIMBER TONGS.

The timber tongs shown in Fig. 5 has proved very convenient in the planing mill and carpenter department. As may be seen, the design is such that the heavier the timber the tighter the tongs will grasp it. Without these tongs it is a difficult job to lift a beam off the floor in order to slip a chain around it, so that it may be handled by a crane. The beam shown in the illustration is 12 in. x 12 in. in section. The tongs can also be used to lift several boards at one time by gripping the lower one.

PLANING SHOES AND WEDGES.

The jig for holding shoes and wedges while planing the outside of the flanges and the inside for the frame fit, which is shown in Fig. 6, is simple and inexpensive. It also has the advantage of allowing the entire shoe or wedge, with the exception of the driving box face to be machined at one setting. Very little time is required to set up and clamp the work. The view at the left shows one of the clamps in detail, and the two views at the right show the application of the device. The clamps have T's which fit in the grooves in the planer bed. To hold the work rigidly and to prevent any possibility of its buckling up, due to the breakage of the T's on the bottom of the clamps, the small 1 in. x 2½ in. clamps, which are held by the ⅞ in. bolts, are used. Each large clamp has a 1 9/16 in. hole through it to take the 1½ in. rod. The number of shoes which can be planed at one time is governed by the

Fig. 5—Timber Tongs.

length of the planer bed. The shoes are placed on the jigs, and the nuts on the 1½ in. rod are tightened, gripping the work at each end. When planing wedges, or work that is tapered, it is necessary to provide the jigs in two heights, using a short one at one end of the wedge and a long one at the other. A combination tool holder having four small cutting tools may be used, allowing the outside and the inside of the flanges to be machined at one time. The 1½ in. clamping rod is threaded on both ends, thus making it possible to tighten the nut on the end which is most convenient.

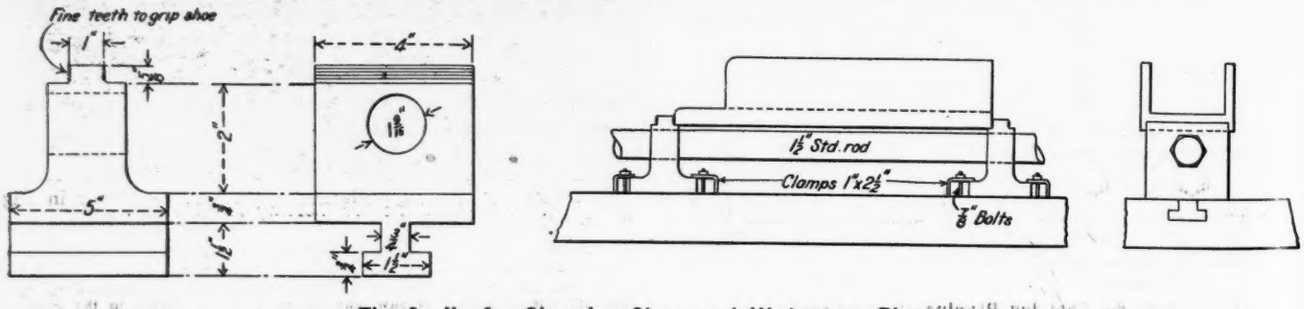


Fig. 6—Jig for Clamping Shoes and Wedges on Planer.

PLANING ENGINE AND TENDER TRUCK BRASSES.

The tool shown in Fig. 7 is used for planning the journal fit of engine and tender truck brasses. Its construction is simple and the radius of the cutting edge should be slightly larger than the radius of the journal, on which the brass is to be used, to insure a good fit. For instance, the tool for planing a brass to fit a 5 in. journal should have a radius of at least

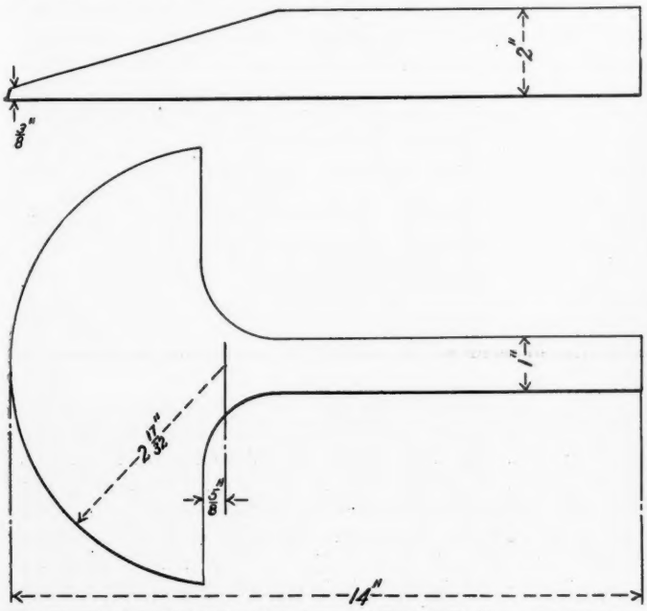


Fig. 7—Tool for Planing the Journal Fit of Engine and Tender Truck Brasses.

2 17/32 in. The tools may be made from soft steel and case hardened; tools should be provided for each of the standard size bearings and should vary by 1/16 in. in radius. In planing a brass the tool is fed down until it is the proper thickness at the crown.

TOOL FOR PLANING CROSSHEADS.

A cutter and tool-holder for planing crossheads to fit the guides is shown in Fig. 8. A number of cutters are provided to suit the different widths of guides. To change them it is only necessary to remove the nuts on the three 5/8 in. bolts and reapply them after the cutters have been changed. The

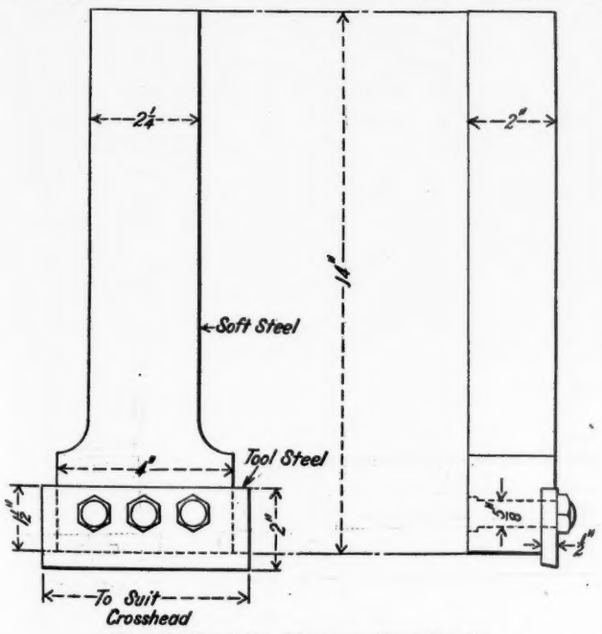


Fig. 8—Tool for Planing Crossheads.

holder is made of soft steel and will last indefinitely, as it has no parts that are subjected to wear. The cutters are made of pieces of ½ x 2 in. high speed steel.

MILLING THE FORKED ENDS OF SIDE RODS.

A simple method of milling out the forked ends of side rods is shown in the photograph, Fig. 9. A spiral cutter is fitted to the boring bar of a horizontal boring machine and

Fig. 9—Milling Out the Forked End of a Side Rod.

operates as shown in the illustration. This method is far more satisfactory than the slower one of drilling and cutting.* As the cutter wears and the diameter becomes less than the width of the opening, it is necessary to take two cuts, but the second one will be so light that it may be done quickly. This scheme may also be used in connection with a vertical milling

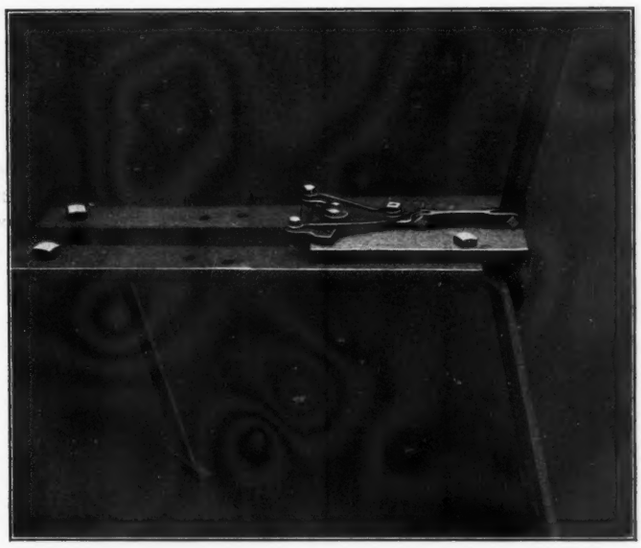


Fig. 10—Device for Bending Cotter Pins.

machine, but the work is easier to handle on a horizontal boring or milling machine.

BENDING COTTER PINS.

A device for bending cellar or cotter pins is shown in Fig. 10, and the die which forms the head of the cotter is shown in the sketch, Fig. 11. The device is operated by a hand lever,

*A tool for forking rods on a slotter which does not require the preliminary use of a drill or saw was described by F. Rattek in the *Railway Age Gazette* of October 1, 1909, page 597.

but in case the cotters should have to be made in large quantities it can be fitted with an air cylinder, which may be placed on the bed of the machine and be connected to the lever. The iron is belt cold. The pin *A*, Fig. 11, is made only long enough

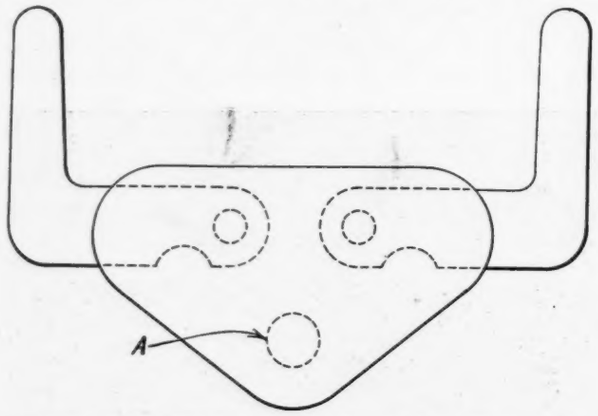


Fig. 11—Dies Which Form the Head of the Cotter Pin.

to hold the pin in place while it is being bent. When the operation is finished the cotter can be lifted up over the pin *A* and be slipped out.

THE SHOP KINK COMPETITIONS.

BY A CONTRIBUTOR.

In looking through some back numbers of the *Railway Age Gazette*, I came across the following on the editorial page of the Shop Section, May 6, 1910: "There are indications that some shop foremen regard their own kinks and labor saving devices as trade secrets of more value if kept to themselves than if published. The contrary is true. We have received letters from the general officers of ninety-two railway companies urging and encouraging us in the undertaking to educate foremen and saying in various ways that they will recognize any of their men who make good suggestions in our Shop Edition. Five of them say they will duplicate any prizes won by their men in our shop competitions. A much larger number ask us to especially call their attention to foremen who send in good suggestions. The foreman who thinks and devises ways of saving time has now a fine chance to improve his condition. The prize money is the smallest element in it."

This is certainly a most gratifying state of affairs, and is evidence to foremen that their movements are closely watched. But, if, on the other hand, all these letters of encouragement, that are no doubt models of rhetoric, correct in form and phrasing and withal business-like, have gone no further and produced no tangible results it would be most disappointing. It would be exceedingly interesting to know how many of the contributors to the shop kink competitions have really received encouraging notice and recognition from their superior officers. How many of the general officers of the ninety-two railway companies have recognized their men, if any of them have sent in contributions. No doubt many have and others have not. It is well known that some officers, not alone in railway circles but in industrial establishments also, withold the word of praise, no matter how deserving the case, and maintain a cold exterior to all beneath them in authority. How these men can forget their own early struggles and ambitions is one of the mysteries of the human makeup that has never been satisfactorily explained. Happily the condition is now more the exception than the rule.

Probably no competitions of this character, or any other series of mechanical articles, have brought out a more splendid and astonishing array of original, useful, practical and labor saving devices than has the *Railway Age Gazette* shop kink competitions, which began in October 1909. In the Railway Shop Kink book, recently published, and now no doubt familiar to many, there has been compiled the cream of all the kinks published in the *Railway Age Gazette* during the past two years.

It would be an interesting mathematical problem, if it were possible to compute the actual saving in the cost of material and labor due to the introduction of these kinks, as compared to methods in use before they were invented and put in service. A few definite statements of increased efficiency have been noted from time to time that serve as examples of the whole. From the Topeka shops of the Atchison, Topeka and Santa Fe we have a babbitting device for lining crosshead shoes, which reduces the time 75 per cent., and results in a saving of $1.13 per shoe, the total saving in one year amounting to $2,191.55. From another shop comes a similar device reducing the time 50 per cent., and saving 40 cents per shoe over the former methods. A jig for holding driving box shells on the slotting machine, which allows the shell to be finished to fit the box in one chucking, reduces the time and labor 25 per cent. The pneumatic ash pit hoist is another long step in advance and easily represents the saving in labor of six men every twenty-four hours. Consider the great saving there is in the improved methods of welding locomotive frames without removing them from the engine, by means of crude oil burners and other methods which have been described. Go into the passenger cars at the terminal and note the workmen cleaning the car seats with a pneumatic suction cleaner, completing an entire car of forty-four seats in an hour. And they are clean too! The dust and dirt is drawn out and not scattered all through the car, as it is when an air blowing method is used; it is carried off and blown away outside of the car. It is also much better than the old way of taking the seats out of the car and pounding them with a carpet beater, destroying the expensive plush covering and making the operator black in the face from his exertions. What is it costing you to do this work per car? Are you following the old method or profiting by the newer and more efficient way?

Again some genius has shown us how to load scrap car wheels economically with a pneumatic platform hoist; it holds sixteen wheels at a time; they are rolled on it at the ground level and raised to the level of the floor of the car by the powerful air jacks underneath.

The development of the oxy-acetylene cutting and welding process has also been shown in considerable detail. In the *Railway Age Gazette* of May 6, 1910, splendid illustrations and examples are shown of the successful application of this method at the Buffalo shops on the Erie. Quoting from this article: "In looking over the plant in search of labor and time saving devices the most striking feature encountered was the use of oxy-acetylene cutting apparatus in connection with the repairs of steel cars and the cutting off of the rivets connecting the coupler and coupler yoke. As far as we have been able to find this is the first place where the oxy-acetylene apparatus has been used for steel car repairs, if, indeed, it is not the only place where it is used for the purpose at the present time. The results that are being gained from its use are so important that it will undoubtedly soon be used extensively at points where considerable repairs are made to either steel or steel underframe cars." Rivet heads melt and vanish under the flame; steel center sills are cut through in from two to two and a half minutes and at a cost of about one-sixth of what it would be by the old method of drilling holes and cutting off by a pneumatic hammer.

Another writer says: "For cutting purposes in the boiler shop it is invaluable. I have often sent the operator in on a big job, and in three hours or less he has done as much work as would have been done by three or four boilermakers and helpers in several days of hard work." Patches are applied successfully to firebox side sheets and stand the highest pressures. Oxy-acetylene welding is also being used extensively in the construction of steel passenger cars for making joints that are strong and durable, having from 80 to 85 per cent. efficiency.

Note particularly the following from another writer: "It was discovered that there was little expert knowledge that could be obtained referring to oxy-acetylene processes, and the development was carried on by shop employees." We have dwelt at some length on these several examples of shop kinks contributed to the *Railway Age Gazette,* not alone to show their efficiency, but to call attention to and bring out the facts as to the real source of this array of splendid and successful ideas, all of demonstrated and practical utility. It is then the workmen, shop foremen, master mechanics, and shop superintendents who have developed these ideas and have given to us these improved methods of production.

Who can measure the hard work and patient toil, the thought and brain power expended by these men down on the firing line? We, therefore, again ask the question: To what extent have they been rewarded and advanced? One writer has said: "A great many more shop kinks would be designed and used were it not for the prejudices of some men in authority, and this same prejudice has hobbled the ambition and aspiration of many a good man. Probably we should have used the term selfishness, the terms are synonymous. A man may be intensely earnest in endeavoring to produce something very practical and very efficient, but if his efforts are not appreciated and he receives no encouragement they count for nothing. The practice of devising shop kinks and methods should be fostered and encouraged to its fullest extent, for it will be to the best interests of all concerned."

It would also be interesting to know how far these various kinks have been of use to other shops, and we would suggest that no doubt the editor would be glad to hear from readers as to the benefits they have received. We recently received a communication from a tool foreman in a large western shop, inquiring for some further information about one of our kinks that he wished to reproduce in his shop.

President Bentley of the Master Mechanics' Association struck the right note when, in a recent address at the convention of the General Foremen's Association he said: "I want to talk to you particularly about getting results. What are general foremen for? What are master mechanics for? What are roundhouse foremen for? What are assistant superintendents of motive power for? They are here to get results, as a business proposition. The companies pay the men a certain compensation for doing certain things. Are we earning the money that is paid us? Are we getting the results that we ought to get? I believe that by your attendance at this meeting you are doing more to earn your salary than you would sitting in your shop for six months. We do too much staying in our own shops."

Truly this is sound advice, right along the line of shop kink work and self improvement. And there is too much staying at home. How pleasant and how encouraging it is, only the shop foreman or superintendent knows who is requested by his superior to spend a week or two, or a month, visiting other shops in search of new kinks and better ways of doing work. It has a broadening effect upon the men. He expands and warms up all through as he feels the honor and trust conferred upon him. It is only one of the ways of rewarding him, and is of just as great benefit to the company as to the man himself.

All honor to the men who are working faithfully along the lines of greatest efficiency and producing really wonderful results. In closing this article let me sound a warning note. Be not too modest, remember that:

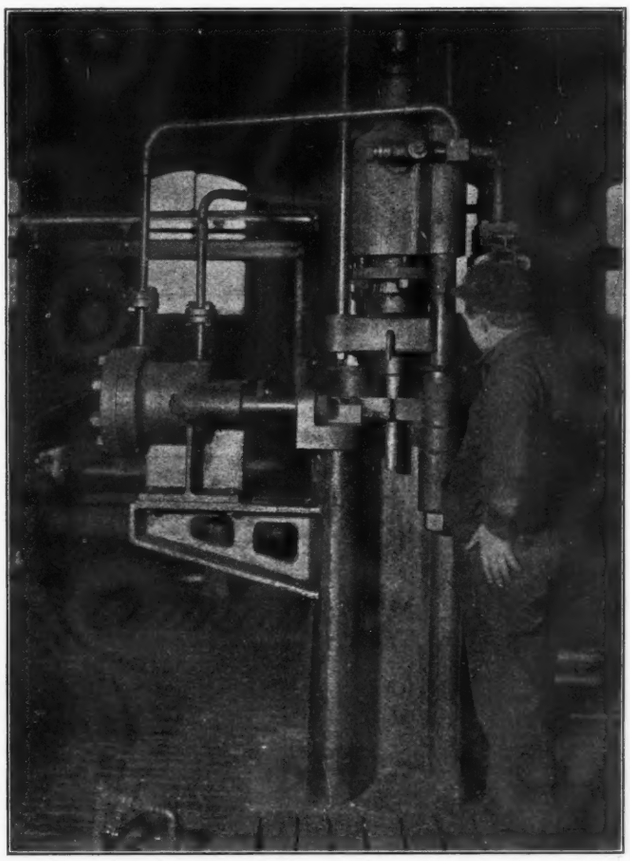
> "Many a gem of rarest ray serene the dark unfathomed coves of Ocean bear.
>
> Full many a flower is born to blush unseen and waste its sweetness on the dense air."

Value yourself and your own attainments at a good stiff premium. Let those higher up hear of you and what you are doing and accomplishing. Make a noise! Toot a little on your own horn. Remember that the soundless horn is of no more use than the sword or pen without a handle.

RECENT DEVELOPMENTS IN TESTING BOILER TUBES.*

BY F. N. SPELLER.

A variety of tube specifications has been drawn up, with that of the American Railway Master Mechanics' Association as a basis, to regulate the quality of the material and the manufacture of locomotive boiler tubes. At the present time each road has a specification of its own, usually differing in some points from the others, but in general requiring a flanging, flattening or crushing down test on one out of each lot of 100 or 250 tubes. In the manufacture of lap welded tubes it has been found necessary, in order that the tubes will be as far as possible uniformly satisfactory, to make such tests on each end of every tube, and a special machine has been made to make these tests on the crop ends as they are cut off. This machine is



Testing Machine for Boiler Tubes.

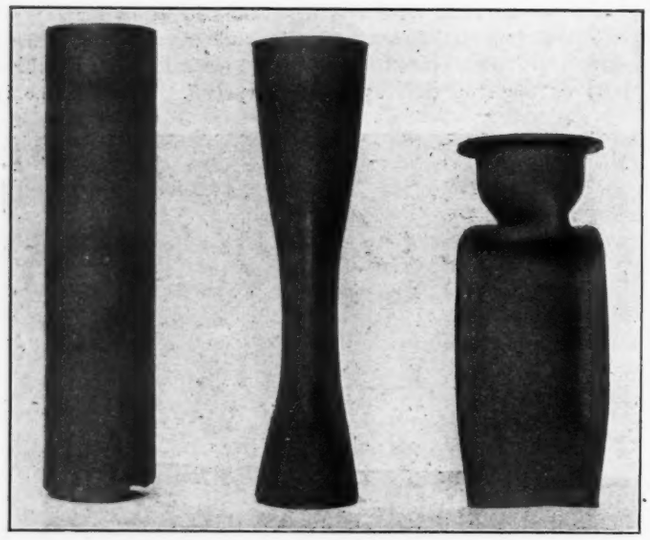
shown herewith and the crop end or a short piece from a tube is being flattened down in the horizontal grips, which hold the piece while a flange is turned by a die. At the same time the sample is crushed down in the direction of the axis of the tube by a ram at the top.

The machine is operated by hydraulic power, both horizontal and vertical cylinders being controlled by the same lever. The flanging die is preferably magnetized by a coil so as to keep the sample in place until the grips take hold. By placing the machine in a convenient position, it may be quickly operated by the man who cuts off the crop end, thereby enabling him to lay aside the tubes which are not welded or which show other defects. This test, made on every tube, makes it almost certain that the weld is as strong as other parts of the tube, and that the physical properties are uniformly up to the required standard.

Among the various requirements in the different specifications for locomotive boiler tubes, there are naturally many excellent

*Presented before the American Society for Testing Materials at the Atlantic City Convention, June 27 to July 1.

provisions, some of doubtful value, and a few clauses which tend to produce the opposite result from that for which the specification was written. Locomotive tubes, whether seamless or lap welded, must sooner or later be safe ended, hence the welding quality of the metal should be one of the first considerations in manufacture. Some specifications now written restrict the chemical composition in some particulars, so as to hamper the manufacturer in making a good welding steel. There is no difficulty in making steel with a maximum of .03 per cent. phosphorus if necessary, but there is reason to believe that .05 per



Crop Ends of Boiler Tubes as They Are Tested.

cent. phosphorus is a more reasonable maximum limit which does no harm, and with other conditions the same, will give a tube better adapted to service and much more easily welded.

Another restriction, which experience teaches is operating against the best quality in locomotive tubes, is the unreasonable sulphur requirements. The highest sulphur allowed in samples taken from individual tubes is, in some cases, .035 per cent., which means that the ladle test must not exceed .030 per cent. With producer gas this means that the heat must often be held and a heavier burden of lime carried which tends to render the steel "dry" in welding and more liable to be crystallized or burned. Personally, I have not found a case of failure which could be attributed to the sulphur being as high as .05 per cent.; on the other hand, there are undoubtedly countless numbers of tubes giving good service which carry close to that amount of sulphur.

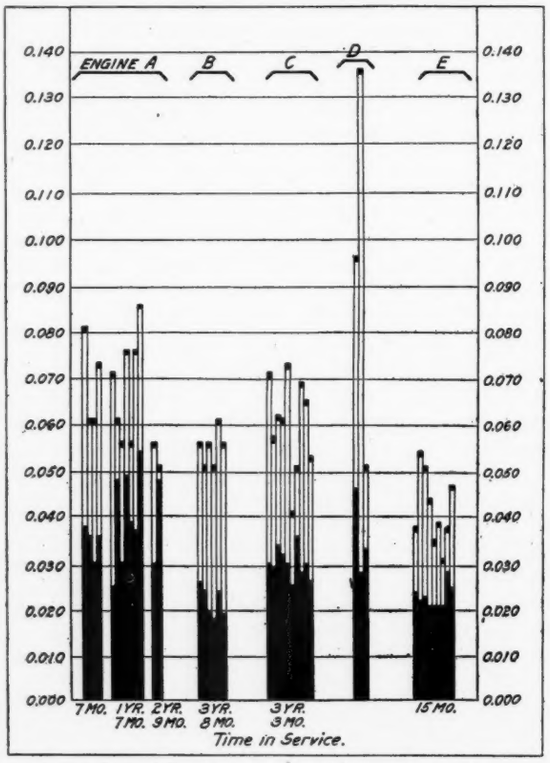
Analysis of the surface of beads taken from tubes after being in the boiler some time, show that sulphur is absorbed from the hot flue gases, so that if there is any advantage in using steel of .030 per cent. sulphur, it would appear to be only temporary. The results of this investigation are shown in the diagram. The locomotives from which these tubes were taken had been operating on different roads under widely different conditions, but in each case the tubes had all given equally good service and were being removed for safe ending. It also appears from a comparison of the sulphur taken up by individual tubes under the same conditions, that there is no consistent relation between the original sulphur and the amount absorbed, so that it does not follow because the tube was originally low in sulphur, that it would therefore show comparatively low sulphur after being subjected to the action of the hot flue gases; the results rather suggest that the low sulphur tubes are more susceptible to sulphurizing by the hot flue gases.

A study of records in lap welding may throw some light on the relative influence of variations in sulphur contents. For example, two heats which had been rephosphorized gave the following welding records, each piece being tested in the flanging machine after the first run through the welding furnace and rejected if there was any indication of an opening at the seam:

Heat No.	No. of Pieces.	Chemical Analyses—Per Cent. S.	P.	Mn.	C.	Per Cent. Not Welded.
3432	1272	.045	.036	.43	.105	14.7
30522	1401	.027	.037	.47	.113	20.2

The average of nine heats of steel which ran .03 per cent. sulphur or less showed 20 per cent. more rejections on account of bad welds, than eight heats where the sulphur ran over .04 per cent., these heats being nearly the same in other respects. As to the effect of foreign elements in these amounts on the corrosion of steel under ordinary conditions, we have no evidence that their presence has any decided effect one way or the other in well made steel, and the grade of soft steel made exclusively for the manufacture of pipe certainly belongs to this class. The degree of uniformity obtained, even between individual Bessemer heats made for this purpose, is, it is safe to say, as good as that shown in the records of the most highly refined product of the open hearth furnace and uniformity, both physical and chemical, is undoubtedly a large factor both in welding and in corrosion.

The supposed beneficial effect of great purity, has, I believe, been greatly over-estimated. Some time ago the writer found by using the sensitive ferroxyl test that cross sections of steel



Lower Shaded Portion—Original Sulphur (per cent.).
Upper Open Portion—Increase in Sulphur (per cent.).

Amount of Sulphur Absorbed by Tube Ends from Flue Gases in a Locomotive Firebox.

which had all the variations due to segregation would not show a regular difference of polarity under repeated tests made on the same section, the explanation evidently being that external influences, such as finish and accidental irregularities in oxidation, predominated and overpowered the much smaller differences in potential, due to irregularities in the metal itself. It is believed that it would be to the advantage of all concerned if a standard specification were agreed upon for boiler tubes, in which there could be no objection to a test on the ends of each tube along the lines described above, provided the chemical requirements were not unnecessarily restrictive.

BENEFITS DERIVED FROM CONVENTION ATTENDANCE.*

BY "W."

To enumerate, or to dwell at length on the exhibits which have interested and educated all of us would be justifiable, but an adequate account of even the least wonderful of the recent developments, which have been so thoroughly illustrated at the conventions, would be out of place in this article because of the large space such an account would occupy, and because the critics have but to see, to be converted, provided their souls are not ossified. However, the value of the exhibits must not be passed carelessly, for what has inspired the inventive geniuses to whom we are largely indebted for the developments in transportation facilities? Certainly nothing more than the accomplishments of others, and what if our transportation facilities had not been developed? And what if this development should cease?

Embryo artists study the masterpieces and seek the association and counsel of the masters. Every one knows that they should do so, and yet some would practically bury the mechanic and inventor whose work is of inestimable value to humanity, and they would also isolate the executive officer, making improbable, if not impossible, the development of plans and practices, the best of which must be adopted if our railways are to continue to exist.

Before attending my first convention I had been an apprentice and machinist, a fireman and locomotive engineer, a roundhouse foreman, a general foreman, and had just been given the title of master mechanic. Perhaps I should have had a fine opinion of myself and a poorer opinion of the rest of the mechanical fraternity, but I had been squelched by those whom long experience should have broadened and made considerate of a young enthusiast; I had been bitten by a snake in man's clothing and had become so depressed that I had developed a lack of confidence in myself and in others. I can only say that I am unable to measure the benefits derived from the council and encouragement given by Robert Quayle in his addresses at various conventions.

I knew something about the detrimental effects of cylinder condensation and my recommendations to apply superheating apparatus had been ignored by my superior officers. Can you not appreciate the satisfaction with which I have listened to H. H. Vaughan and Prof. Endsley? I have wondered whether Mr. Seley, Prof. Goss and others whom we juniors so admire, wasted as much time in their youth as I have wasted, and if it is possible for me to acquire such a fund of valuable theory, backed by practical experience or experiment, as they possess. My attendence at conventions is responsible for my determination to attempt such heights.

I had studied air brake construction and manipulation, and felt that I had a good working knowledge of that art until I heard Walter V. Turner, T. L. Burton and several others, after which I realized how little I knew and how intricate the problems were. I appreciated more fully what a charming study it is, and I was made proud of my profession and determined to get out of the rear ranks if possible. No one can listen to our "Traveling Engineers" without admiration and appreciation of their sterling worth. Do not ask the fossil who is kept from drowning by being stuck in a rock; ask the man who does things—the road foreman—whether conventions pay. You may not hear his answer, but you'll get a look that will reply in full to your inquiry.

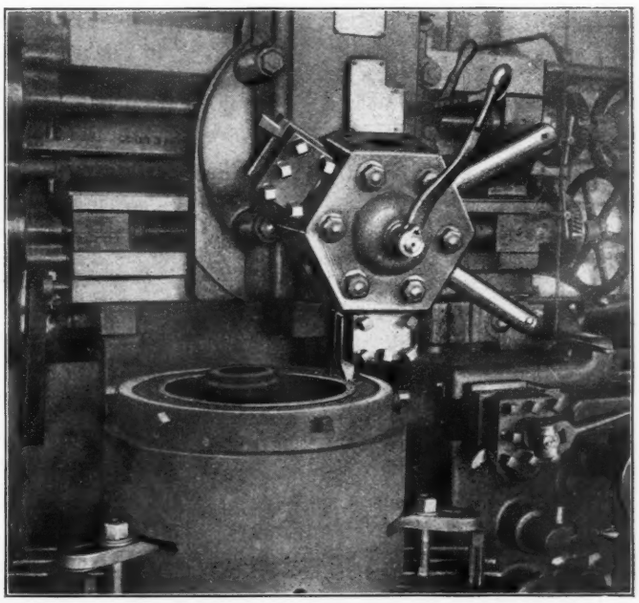
Can anyone read the address made by J. F. Deems at the Master Mechanics' convention in June, 1907, while he was president of that association, without emotion which enobles, or without appreciating the necessity for the most thorough team work? I quote from that address: "Throughout all time, all great works have been effected by earnest men, few or many, brought together by a common object or a common impulse," and later in the same address: "We may reach perfection in all these, in mechanism, structure and method, and yet our bequest be a failure and itself a burden unless we provide that which is paramount, which is over and above the sum total of all this, and for which even today events throughout the world are crying aloud—*the man.*" Mr. Deems placed great emphasis on the need for the man who is prepared. I believe that even the critics appreciate that need; their superior officers certainly do, and so let us continue to exchange our views and generously share the results of our experience, for such practice has increased our value to our employers and to the public and has assisted largely in making possible our present civilization. To discontinue the conventions would have the same detrimental effect on the transportation business as a discontinuance of church services would have on religion. Besides, the old adage about "all work and no play" is quite true still, and many a mechanical department man is busy every long day, including Sundays, with the never ceasing grind, except during convention week. Some fun and relaxation are to be had there, and even in the pleasure there is much profit. Can anyone listen to Eugene Chamberlain without being made glad; and during his exquisite references to the ladies, do we not down deep in our hearts make resolutions to be more considerate of the good wife or mother to whom we owe so much? I cannot understand why you recognize a possibility for a discussion on this subject.

*Submitted in the competition which closed October 15, 1911.

MACHINING TANK WELL CASTINGS.

BY C. E. PADDACH.

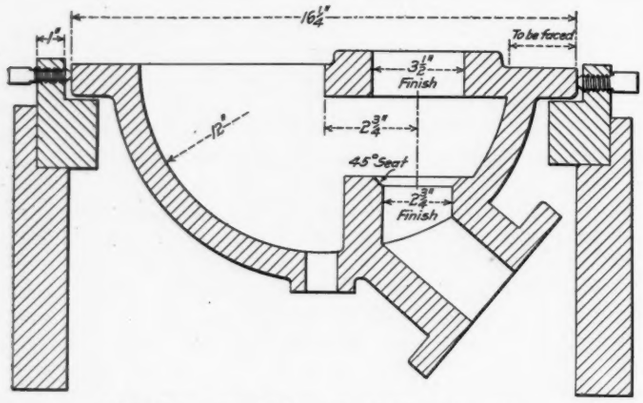
Although a tank well requires little machine work, it being only necessary to face the joint and bore the hole for the valve and face the valve seat, yet it requires two settings and is such an awkward shape that in doing this work on the ordinary lathe considerable time must be spent in adjusting it properly. The accompanying illustrations show a good method for machining tank wells on a turret head boring mill. A master chuck is made of a hard cast iron cylinder, which is cut away at the top, as shown in the illustration, for a ring of the same material that is pressed in. This ring is provided with set screws for holding the tank well. The chuck is made in this way to prevent the head of the set screws from extend-



Finishing Tank Well Castings on Turret Head Boring Mill.

ing too far beyond the circumference of the chuck, thus reducing the liability of their catching in the clothing of the workmen. The chuck is also provided with slots in its sides, so that it may be rigidly clamped to the table of the boring mill.

The chuck is first clamped firmly in the centre of the table The casting is placed in the chuck and is adjusted centrally by the set screws. Two cutting tools are used for facing the casting, one for roughing and the other for finishing. The second operation is that of boring out the casting for the tank



Chuck for Machining Tank Well Castings.

valve; as the hole is located off the centre of the casting the chuck will have to be readjusted. A boring tool and a valve seating tool are used for the operation. The four tools for the different operations are placed in the turret head, and when once adjusted can be used for a number of castings. Where several castings are to be machined it will be quicker to face the joints of all them first, thus taking advantage of the correct setting of the chuck, and then bore out all the valve seats at the second setting.

COPPER IN ENGLISH LOCOMOTIVES.*

About 13 per cent. of the total weight of the 4-cylinder passenger engines of the Lancashire & Yorkshire consists of brass and copper. These locomotives are made with copper fireboxes, copper tubes and copper staybolts, the total weight of the copper being 25,300 lbs. The copper fireboxes have a life of 10 to 16½ years; the fireboxes of the older engines with 140 lbs. boiler pressure gave a mileage as high as 500,000 miles; however, an average figure for seventy engines was found to be 310,000 miles. On six-wheel freight engines working at 160 lbs. the average life of the copper firebox is eleven years with an average mileage of 235,000 to 272,000 miles. These figures are based on records of 120 locomotives. The copper tube sheets usually require renewing once during the life of the firebox. An average of tests shows the strength of the copper staybolt to be about 33,200 lbs. per square inch, and it has an elongation of 40 per cent. in 8 in.

The staybolts are made 1 in. in diameter and have eleven threads to the inch, the center being turned down below the bottom of the thread to about ⅞ in. diameter. A comparison of the life of copper and steel tubes is given for a period of eight years. New copper tubes are credited with 110,000 miles, while new steel tubes will run between 70,000 and 80,000 miles. While the copper tubes are used extensively in England, the mild steel tube is the standard practice. The tests included in the specifications of copper boiler tubes require a tensile strength of 38,100 lbs. per sq. in., and an elongation of 25 per cent. in 8 in.

*From a paper read before the Institute of Metals, England, by George Hughes, chief mechanical engineer, Lancashire & Yorkshire.

BENEFITS DERIVED FROM ATTENDING CONVENTIONS.*

BY GEO. H. ROBERTS,

Machine Foreman, Long Island, Morris Park Shops, N. Y.

Shop foremen, until within the last few years, have seldom had an opportunity of getting out to see what others are doing. Things have changed and now he may attend the conventions and meet men in his own line of work from all over the country. He can remain at home and read the proceedings of the conventions in the technical papers, but it is impossible for him to take the interest in them or receive the benefits that he would by attendance at the conventions. If a man does not read or come in contact with other men in his line of work he is liable to become set and labor under the impression that he is accomplishing the best that can be done.

In these days of progress one must be constantly on the alert or find himself left behind, for practices and methods considered good today are discarded tomorrow for something better. The conventions offer the foreman a solution for many of his troubles; he meets other men holding similar positions, and an exchange of ideas is possible, from which much benefit may be derived. By becoming a member of one or more of the associations it will awaken a desire to accomplish something himself and not merely to hear what others are doing.

Merely leaving his troubles at the shop and attending the convention will do him more good than all the medicine in the country; in fact, a little trip as a rule does any one a great deal of good; a change of scene will do wonders towards health and happiness to persons confined to the same scenes day in and day out. A farmer whose wife had been taken to an asylum was questioned as to the reason and replied: "I don't see why she should have gone crazy, for she hasn't been out of that kitchen for nigh on twenty years."

There is a general feeling of good fellowship at the conventions, all being ready to discuss a point or something new in the shape of a machine or appliance. The exhibits, especially at the Master Mechanics' and Master Car Builders' conventions, are very instructive, as practically all the latest developments in machines and railway appliances are exhibited, with able men to explain and demonstrate them. The work accomplished by the Master Car Builders' Association is world renowned. By having M. C. B. standards, it is possible for a New England freight car to travel all the way to the Pacific coast and return without being held up for a journal box, brass, drawbar or a pair of wheels. A few years ago this was impossible.

The large railway systems have adopted standard locomotives to permit of equalizing the power from one line to another; this would be practically impossible if each line had its own designs regardless of the other parts of the system. If this has paid, it certainly must pay to have the various foremen and higher officers meet to discuss and decide on the best methods for important operations in the shop.

The social side must not be overlooked, for at most of the conventions delightful programs are prepared for the entertainment of the members and their families, making it a pleasant event to look forward to each year. The conventions broaden a man socially and mentally, keep him up to date, and are an incentive for him to achieve greater things.

An Atlantic type locomotive has been designed by Dugal Drummond, chief locomotive engineer of the London & Northwestern, which is capable of hauling a heavy passenger train of 13 coaches at a rate of over 60 miles an hour. Five of these engines are being built at the Eastleigh works. They are intended for fast passenger traffic between Waterloo, England, and Bournemouth.

*Entered in the competition which closed October 15, 1911.

BENEFITS DERIVED FROM THE GENERAL FOREMEN'S CONVENTIONS.*

BY WM. HALL,†
General Foreman, Chicago & North Western, Escanaba, Mich.

I look on the annual conventions as a purely business proposition. I expect to attend the meetings and to be just as faithful as if I were in the shop. Attendance at the conventions has broadened my sphere of usefulness to my company and myself. Too many men look upon the annual convention as a holiday, or a chance to have a good time; such men had better stay at home. In fact, if the plans proposed by the executive committee for next year are carried out, each one who leaves his home shop, ostensibly to attend the convention, had better put in an appearance at each session, for his superior officer will be in a position to know of his attendance or non-attendance.

The General Foremen's Association is looked upon by some as somewhat of a labor organization, and they are afraid that if they join they will jeopardize their positions. At least, I judge this from some replies I have received from foremen who have been invited to join the association. If these men will attend one of the conventions, they will soon find out that it is an organization of wide-awake men who are seeking to further the interests of the companies employing them; their own interests are of a secondary consideration. Again, some are egotistical and have an idea that they have nothing to learn by attending the conventions, or visiting other shops. Let these men come to the conventions and learn how little they do know.

Attendance at the annual conventions, and the opportunity of viewing the exhibits is a first-class school of instruction for the foremen. Here they will see things and hear views expressed that they never dreamed of, nor in a great many instances would see or hear of by staying at home a lifetime. Nothing tends to depreciate a man's worth, both to himself and the company employing him, more than being compelled to stay in his home shop and not come in contact with those engaged in the same or similar pursuits in other shops. I feel better in every respect after each convention, and I return to my shop with more vim and vigor, and with a firm determination to improve upon some one thing, at least. I cannot always do as my inclinations would lead me, but I do the best I can under existing conditions, and my company is the gainer; I lose nothing, for my mind is broadened.

The daily grind sometimes becomes monotonous, but these yearly visits to the conventions, with an opportunity of visiting different manufacturing establishments, is an inspiration. If it does not have this effect, the foreman is a dead letter, and is in the wrong place. A great many people, unable to travel but anxious to know more of what this world of ours contains, and what it is doing outside of their own contracted sphere, consider the next best thing for them to do is to attend lectures given by Burton Holmes and others. Those who are unable to visit other shops should at least attend the annual conventions; and not only learn what others are doing, but tell what they are doing themselves. If a foreman intends to be a live wire, and keep abreast of the times, he should attend the conventions. The next best thing to do is to subscribe for good technical papers, and keep in touch with what is going on around him.

When I was employed in Chicago, I attended the weekly meetings of our foremen, and it was always my ambition to be a little ahead of the game. Attendance at the General Foremen's conventions acts as a great inspiration and a desire to be doing as good as, if not better than, the other fellow. By making a visit to another shop, I accidentally learned of the idea of welding locomotive frames with oil without removing the frame; on my return home, I reported my find to my superior, and we put the new scheme into practice at the first opportunity we had, and with good results. At my first attendance at the General Foremen's convention, I saw frames welded by thermit, and at once realized how far ahead this process was. We adopted the thermit welding with excellent results.

The more remote a man's shop is from headquarters, the more good the attendance at the convention will do him. I have learned of various shop kinks that have not been published so far, and which I intend to install at the earliest opportunity. My knowledge of shop methods has also been increased since the last convention. It has taught me to take a more active interest in devising means of arriving at the daily cost for repairs. I have gained new ideas of specializing work. I also learned how to increase the efficiency of the shop by the introduction of good shop kinks and the adoption of the best methods of handling the work.

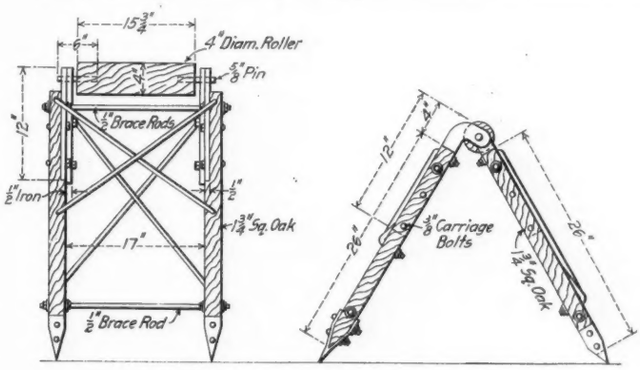
*Entered in the competition on Benefits Derived from Convention Attendance, which closed October 15, 1911.

†Mr. Hall is secretary of the executive committee of the International Railway General Foremen's Association.

ADJUSTABLE HORSE FOR PLANING MILL.

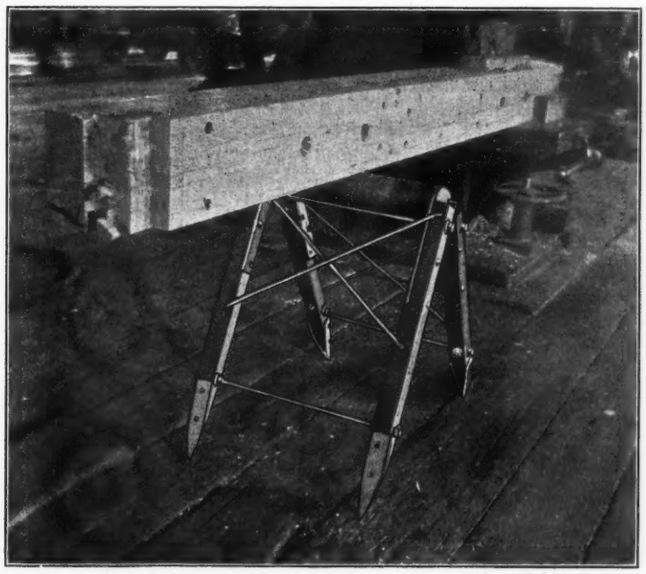
BY F. W. BENTLEY, JR.,
Chicago & North Western, Huron, S. Dak.

An adjustable horse for use in a planing mill should be easy of adjustment and at the same time stiff and rigid. In most cases one of these qualities is sacrificed to secure the other. The accompanying drawing and photograph illustrate a device that



Adjustable Horse for Planing Mill.

possesses both of these requirements and has given good satisfaction. The legs are made of oak and each pair is rigidly tied together by the ½-in. horizontal rods and by the diagonal braces, as shown. The lower ends of the legs are fitted with sharp iron



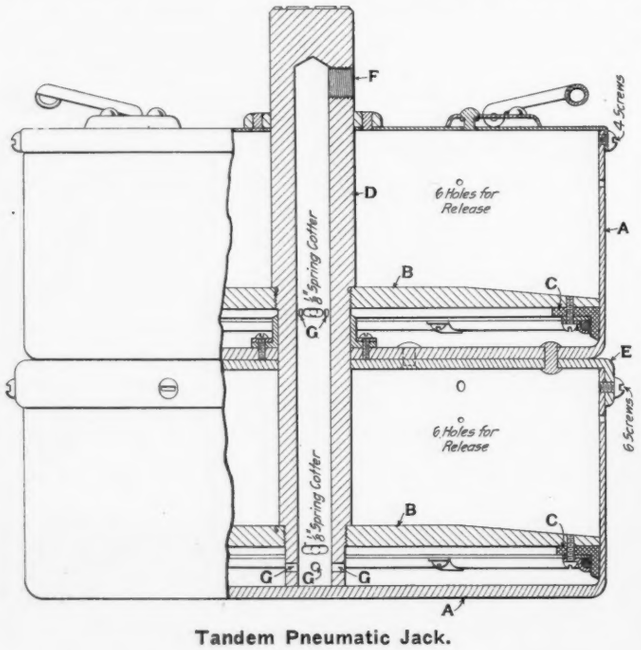
Adjustable Horse for Planing Mill.

points, so that there will be no danger of slipping. The 4-in. wooden roller is held in place by the 5/8-in. pins. There are no set screws to work loose and no unreliable dogs to unlock and allow the load to drop. It may be instantly set up and because of the extent of its base remains rigid under the load, regardless of any tendency to tip as the load is pulled forward or backwards over the roller.

TANDEM CYLINDER PENUMATIC JACK.

A new type of pneumatic jack shown in the accompanying illustration is made by the Pneumatic Jack Company, Louisville, Ky. It is of unique construction, in that it has a tandem cylinder arrangement, which provides double lifting power. It is designed in a compact manner, which makes it convenient to handle.

The construction is simple and may be readily understood by referring to the illustration. The parts *A* are pressed steel cylinders into which the boiler steel pistons *B* fit. The pistons are screwed to the same piston rod or plunger *D*, which is made of cold rolled steel shafting, and are locked to it by 1/8 in. spring cotter pins. The center of this rod has a 3/4 in. hole running part way through it, which conducts the air from the hose connection *F* to the underside of the pistons through the ports *G*. Leather washers *C*, of the Westinghouse standard, are fastened to each of the piston heads, and are forced against the sides of



Tandem Pneumatic Jack.

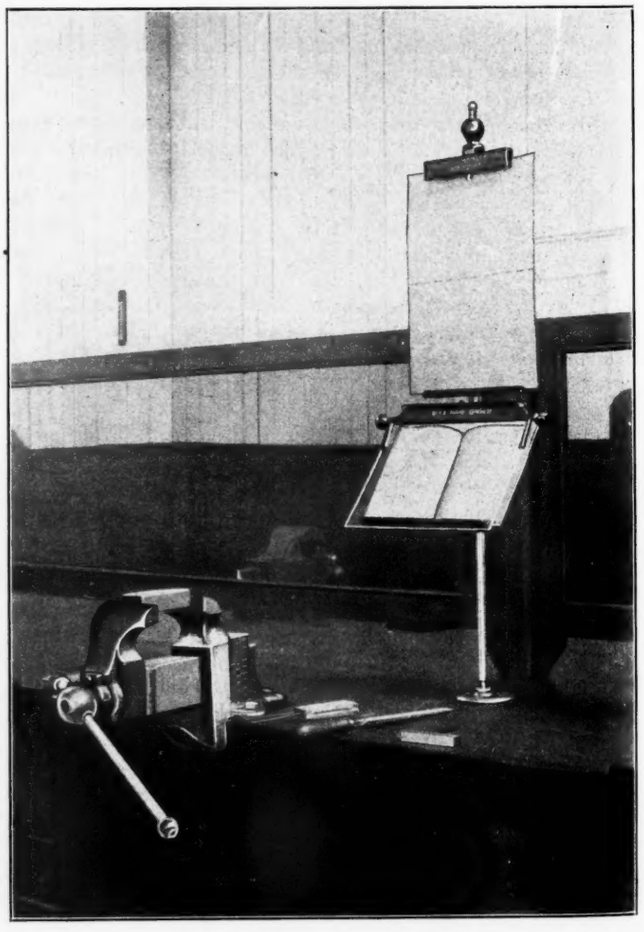
the cylinders by expansion rings, forming air tight joint. A cover *E* is placed over the lower cylinder and gives additional stiffness to both the walls of that cylinder and the base of the upper cylinder. The six holes shown near the top of each cylinder are for the purpose of releasing the air when the piston has traveled above them, thus preventing the rupturing of the cylinders.

These jacks are made in 12 in. and 18 in. sizes. The 12 in. jack, weighing 58 lbs., is used for raising cars when renewing the journal brasses, for pressing in side rod bushings with the rods in place, and is also of value in general shop work. The 18 in. jack is built for work in the car shop, engine-house and general yard work. It weighs 250 lbs., and is provided with a detachable truck, which permits it being handled by one man. The jacks may be handled by inexperienced workmen and their parts are standardized so that any broken part may readily be replaced.

BLUE PRINT AND BOOK HOLDER.

The machinist is often handicapped by having to use crumpled and dirty blue prints. Where prints are used repeatedly they soon become too soiled to read, especially where they are handled by the workman and laid down with his oily tools. To overcome this a blue print holder has been designed and patented by R. H. Smith, instructor in the mechanical laboratories of the Massachusetts Institute of Technology. It consists of a rod which holds the brackets for the blue print, and also, as shown in the illustration, a bracket for a book. The lower bracket for the blue print is held to the rod by a thumb screw and the top bracket is free to move up or down. The illustration shows the way in which a mounted print is held. When the print is not mounted the bottom bracket is raised and the top of the sheet is held between the upper and lower brackets, the upper one holding the print by the pressure exerted by its weight.

The book holder is adjustable on the rod and is made with the customary shelf, having a lip on the bottom edge to hold the book. To prevent the book from becoming soiled and also to keep it open, a celluloid cover, fixed in a weighted hinge, is swung down over the pages, the weight of the hinge being sufficient to keep the pages flat. About 75 of these combination



Blue Print and Book Holder.

blue print and book holders have been installed in the mechanical laboratories of the Massachusetts Institute of Technology. In cases where it is inconvenient to fasten the rod to a bench it may be held in an arm extending out from the bed of a machine. The device keeps the blue print or book always open before the operator, out of his way, and always ready for reference in a place where it may easily be read. It is sold by the Industrial Education Book Company, Boston, Mass.

General News Section.

The Southern Railway is to introduce telephones for train despatching on its line between Chattanooga and Knoxville, 111 miles.

Uniformed maids are now employed on the ferry steamers of the Southern Pacific crossing San Francisco Bay. Many of the principal stations of the Southern Pacific have maids in attendance.

The Atlantic Coast Line and the Charleston & Western Carolina on November 1 began using their new freight yard in the eastern part of Augusta, Ga. About $80,000 has been spent in the building and fitting of this yard.

The Lake Shore & Michigan Southern has ordered from the Western Electric Company telephone and selector equipment for five new train despatching circuits. These installations will increase the mileage of telephone train wires on that road from 1,100 miles to 1,850 miles.

There are now enrolled in the educational bureau of the Illinois Central 3,200 employees of that road, and 9,000 lessons and pamphlets have been sent out to students since the bureau was started. Besides this number over 500 students in the station and traffic courses have received their first lesson.

The government of Canada, under the new ministers, is expected to provide for two railway commissions, dividing the dominion into two districts—an eastern and a western. The headquarters of the new board will probably be at Winnipeg, while the commission for the eastern district will be at Ottawa, as now.

Members of the boilermakers' and sheet-ironworkers' unions at the Schenectady shops of the American Locomotive Company went out on strike last week Thursday, because the company called upon them to work on 30 engines, ordered about two months ago, for the New York Central, the reason being that the boilermakers of the Central are on strike. An officer of the works said that other men would be secured to take up the work which the strikers dropped.

Striking car men on the Missouri, Kansas & Texas who were to return to work on October 25 or consider themselves permanently out of the service of the road have not returned. Representatives of the federation of shop employees on that road say their members will strike unless their demands are settled through the system federation and the company has refused to deal with the federation. Shop employees on the Texas & Pacific have asked officers of the road for a conference with representatives of the federation, but it has not been granted. Shopmen on the Rock Island have rejected the offer of the company to make certain changes in working conditions without any wage concessions.

Steps are being taken by the Chicago Great Western to organize a safety bureau which will provide for systematic watchfulness in all departments of the road to prevent accidental personal injuries to employees and patrons. A managing or central committee, composed of the following officers of the road, has been appointed: Hiram J. Slifer, general manager; J. G. Neuffer, superintendent of motive power; L. C. Fritch, chief engineer; G. O. Perkins, superintendent of telegraph; Dr. G. N. Wassom, surgeon, and J. H. Ambruster, chairman educational committee.

The Chesapeake & Ohio is making plans, it is said, to make a model railway employees' town at Silver Grove, on the line of its road, 13 miles east of Cincinnati. The Silver Grove Land & Building Co. has been chartered in Kentucky, with a capital of $100,000, to carry out the work. The directors of the new company include the following Chesapeake & Ohio officers: G. W. Stevens, president; D. Axtell, first vice-president; E. W. Grice, general manager; G. B. Wall, assistant to the president, and J. P. Stevens, general superintendent. E. G. Finnall and M. Galvin, real estate dealers of Covington, Ky., are also directors.

The suit of the Pennsylvania Railroad to test the constitutionality of the "full-crew" law of the State of Pennsylvania, was heard by the county court at Harrisburg October 27-28. Trainmasters and other officers of the road testified that the law was unnecessary and unduly expensive. The brotherhoods brought to the court 25 of their members, ten of whom gave testimony as to the situation on four of the principal roads of the State, some of the men being employees of the Pennsylvania. They told what various duties were required of trainmen, and claimed that because of the requirements, the full crew law was just and necessary. It was said that the Pennsylvania had reduced the size of certain train crews when the law went into effect.

The first meeting of the Chicago Great Western Station Agents' Association, which was organized last June for the purpose of bringing local agents nearer together, was held at St. Paul, on the Northern division, September 23, when 32 officers and agents were present. Agents of the Western division met on October 14 at Clarion, Iowa, 42 agents being present, and the third meeting was held at Des Moines, Iowa, on October 21, when agents of the Southern division met to organize their local association. Bi-monthly meetings are to be held on each division with occasional general meetings. At the gatherings on the three divisions mentioned, after the conclusion of the business meeting, the agents were met by train and yard employees of the division and all joined in a dinner and entertainment provided by the superintendent.

M. C. B. Temporary Car Coupler.

The secretary of the Master Car Builders' Association announces that the temporary car coupler, which was submitted to letter ballot, has been approved by a large majority of the members of the association. At the convention, in June, the committee on coupler and draft equipment was instructed to prepare a design for a temporary coupler to provide the necessary end clearance required by the new safety appliance standards. This was to be referred to the executive committee as soon as possible, and if it met with the approval of that committee was to be submitted to letter ballot. An abstract of the report of the coupler and draft committee, which was approved by the executive committee, and which has been acted upon favorably by the members of the association, is as follows:

The committee has carefully considered the data and recommendations received in reply to a circular which was sent to the members of the association, and after a thorough discussion has unanimously agreed that it would be inadvisable to establish more than one M. C. B. temporary coupler to take care of the additional end clearance required by law on existing cars. The amount the head should be lengthened between the coupling face and striking horn was considered both from the standpoint of the number of cars to be taken care of and the amount the head could be lengthened without materially impairing the strength of the present design of coupler, as well as the effect on the car construction. The committee recommends that the head be lengthened 3 in. between the coupling face of the knuckle and the striking horn of the coupler, making this dimension 12¼ in. for the temporary coupler. This will take care of 82.5 per cent. of the number of cars reported requiring additional end clearance, and covers 80.1 per cent. of the recommendations submitted by the members of the association replying to the circular.

As the present M. C. B. standards do not cover the detail design of the coupler head, it will only be necessary to add a note to Sheet M. C. B. 23, reading as follows: "12¼ in. for M. C. B. temporary coupler"; this note to be placed above the present note shown on the plan view of the coupler heads, reading as follows: "9¼ in. on all new types after January, 1909," and suitable reference made in text.

It should be understood that if the temporary coupler, which provides 3 in. additional end clearance, is adopted, cars used in interchange which cannot be made to conform to the required end clearance by applying this temporary coupler must be changed, for if railways would purchase temporary couplers of different lengths than that recommended a chaotic

condition would result in repairs, and the end clearance required by law could not be maintained by the foreign railways on the cars in question, which would not be true if all roads owning cars requiring additional end clearance would confine themselves to the one temporary standard, which it will be necessary for all roads to carry in stock in order to make proper repairs to foreign cars while on their lines. For this reason the committee recommends that the letters "T. S." (standing for Temporary Standard), in addition to the letters "M. C. B.," be stamped on the slightly raised plate or flat surface now cast on the head. It is understood that the temporary coupler must comply with all the specifications and tests of the M. C. B. Association.

With the view of avoiding an increased number of new designs of couplers and thus increasing the number of parts, such as knuckles, locks, etc., that must be carried in stock for repairs, the committee feels that the parts of the standard couplers now in use on the various roads should be maintained interchangeable in the new temporary coupler. The committee on coupler and draft equipment was instructed to design one standard coupler, and it is now engaged upon this work, and until such time as the committee is able to report to the convention it is inadvisable to make any changes in the present designs of couplers, with the exception of strengthening parts that can be done without affecting interchangeability.

Loyal Foremen on the Southern Pacific.

When the strike of shop employees on the Southern Pacific was called, the foremen of the motive power and the car shops were ordered to go out. Those at Los Angeles, Cal., showed their loyalty to the company by refusing to do so, and on October 15 sent the following communication to the local advisory board of the Federation of shop employees at Los Angeles:

We, the undersigned foremen of the motive power and the car department, make reply to your letter of October 14, addressed to the foremen of the Harriman lines, calling us out on that date, received by special messenger. We were, to say the least, surprised to receive this summons. We were surprised because your officers presumed to dictate our policy, although we are not members of your association, and therefore cannot be expected to show allegiance. We have had no hand in forming your association, and have never been invited to participate in your counsels and were denied the privilege of voting. This is, therefore, "taxation without representation." As men of honor and having been chosen foremen, and thus accepted official positions, we are in duty bound to support the company as officers, the same as we would be bound by the laws of nations and humanity, were we officers of a ship disabled. This would be our duty no matter what our sentiments might be, or where our sympathies might lie. You expect and urge loyalty; we would be remiss in the loyalty we owe the company we are serving as officers were we to leave our posts. That being our conclusion, we are firm in our determination to continue in the service. We hope this will clearly define our duty as we see it, and that it will be accepted in the spirit in which it is given. Yours truly, W. F. Merry, general foreman of the locomotive department; G. A. Reichert, general boilermaker foreman; E. R. Winnett, assistant general boilermaker foreman; R. Enright, foreman pipe fitter; A. Whitaker, carpenter foreman; John H. Crawford, air brake foreman; James F. Nolan, roundhouse foreman; S. S. Huntley, foreman copper shop; A. P. Neff, machine foreman; F. E. Cowan, foreman blacksmith; G. E. Avan, foreman bricklayer; E. K. Sergel, chief electrician; H. B. Wilson, foreman of the truck builders in the general shop; G. E. Carpenter, foreman of the truck builders in the roundhouse; Thomas Nash, outside foreman; H. Neville, toolroom foreman; D. Adamson, gang foreman; H. R. Dixon, night roundhouse foreman; C. C. Ream, machine foreman; George H. Goodwin, general gang foreman; James Burchill, gang foreman; C. B. Felt, air brake foreman; George Latham, rod foreman; C. T. Hawkins, assistant blacksmith foreman; Charles J. Humphreys, injector bench foreman; John Sorenson, general foreman of the car department; A. G. Saunders, assistant general foreman of the car department; C. M. Littleton, mill foreman; Ernest A. Hammond, assistant car foreman; H. A. Nelson, assistant car foreman; M. F. Nightingall, assistant foreman; A. H. Seevers, assistant foreman; John A. Parkhurst, assistant foreman; Berry L. Isbell, assistant painter foreman; James Humphreys, car foreman; F. H. Oldenburg, assistant car foreman; J. R. Dwyer, upholsterer foreman; Alfred Way, foreman of air brake repairs; M. W. McClean, foreman of the plating department; Robert Dreaper, foreman of the car department tin shop; W. D. Zietz, foreman of steel car repairs; J. B. Augustus, foreman of freight car repairs; John Kaler, foreman of air brakes; S. S. Washburn, assistant foreman of the car shop; William Leffert, foreman of the trimmers; J. H. Cooke, foreman of the coach shop; G. Mortensen, foreman cabinet maker; C. H. Marshall, foreman painter; S. A. Crumrine, foreman of sand car repairs; William O. White, traveling car inspector; A. R. Valentine, car foreman; H. S. Papenfuss, assistant foreman; W. F. Phillips, assistant foreman; W. B. Johnson, foreman; D. R. Murray, foreman; N. Freeman, assistant foreman; C. F. Allen, wrecking foreman; H. W. Sherlock, assistant foreman; A. Cross, foreman; A. M. Foster, assistant foreman; W. H. McPherson, foreman; E. P. Howe, foreman.

"The Transportation Tax."

We have of late heard a good deal referring to the railway earnings of the country as a tax on the people. Taking the total earnings for the year ending June 30, 1911 ($2,700,232,308), it is claimed that such was a tax of $35 on each individual; $140 per family, and an impost, or tax, of $5 per acre on all the improved land in the United States.

To speak of the cost of transportation as a tax is as ridiculous as to speak of the cost of food or clothing, or the rental cost of a house as a tax on the people. In the complex organization of modern society every person contributes to the welfare of practically every other person. It would be as sane to speak of the farmer levying a tax on each American family for the food he furnished them. The farmer and the railway each perform a service of value to the consumer; the one in producing, the other in bringing to him the articles required by him; and they are equally worthy of compensation for the service performed.

The report of the operations of the railways of the United States for the year ending June 30, 1909, shows:

Total Earnings	$2,419,299,638
Number of Employees	1,502,823
Total Wages Paid	$988,323,694
Average per Employee	$657

The census report just published on the manufacturing industries of the United States, for the year 1909, is as follows:

Total Value of Products	$20,672,052,000
Number of Employees	7,405,313
Total Wages Paid	$4,365,613,000
Average per Employee	$590

The Year Book of the Department of Agriculture, just published, shows the value of all farm products for the year 1910 to be $8,926,000,000.

If the allegation of the writers and public speakers referred to is correct, it would be fair to assume that the value of farm products and the value of manufactured goods is also a tax on the people, and the statement would read as follows:

		Tax Per Family.	Tax Per Improved Acre.
Railroad Earnings	$2,419,299,638	$124	$5.07
Value of Manufactured Products.	20,672,052,000	1,056	43.30
Value of Farm Products	8,926,000,000	456	18.70

A great part of the tonnage carried by the railways went into the manufacturing industries and building trades, benefiting millions of people, who could not have made their living without the aid of the railway, which institution is entitled to compensation for doing its part in the social and industrial fabric.—*From a circular issued by J. F. Holden, vice-president of the Kansas City Southern.*

The Southern Pacific Train de Luxe.

The Southern Pacific announces that its fast excess-fare train between New Orleans and San Francisco will make its first trip from New Orleans December 4, and from San Francisco December 5. It will make close connections with the fastest eastern trains at New Orleans, and also with Southern Pacific steamships in both directions between New Orleans and New York. It will be run twice a week. The cars will be new all steel Pullmans. They will be named after the steamships of the Southern Pacific. There will be six cars in each train,

a dynamo baggage car, a diner, three sleeping cars, each containing ten sections, two compartments and one drawing room, and one observation-smoking car. The trains will have stenographer, barber shop, shower bath, ladies' maid, etc. They will have electric lights and fans throughout. Telephone connection will be established with the trains at the stations in New Orleans and San Francisco. The schedules will be approximately as follows: Leave New Orleans, 12:30 p. m. Mondays and Thursdays; arrive at Los Angeles 9:15 p. m. Wednesdays and Saturdays, and San Francisco at 11:00 a. m. Thursdays and Sundays. The run to Los Angeles will be made in 58 hours 45 minutes, and to San Francisco in 72 hours 30 minutes. The train will leave San Francisco at 6:30 p. m. Tuesdays and Saturdays, arrive at Los Angeles at 8:30 a. m. Wednesdays and Sundays, and arrive at New Orleans at 7:20 p. m. Fridays and Tuesdays. The run from San Francisco to New Orleans will be made in 70 hours and 50 minutes, and from Los Angeles to New Orleans in 56 hours and 50 minutes. This will effect a saving to passengers of over 24 hours in each direction, as compared with other trains. The extra fare will be ten dollars. Stops for passengers will be made at Houston, San Antonio, El Paso, Tucson, Maricopa, Phoenix, Yuma, Colton (for Riverside, San Bernardino, etc.), Los Angeles, Santa Barbara, Paso Robles, Castroville (for Del Monte), Pajaro (for Santa Cruz), San Jose and San Francisco.

The railway commission of Texas has raised objection to the charging of extra fares on these trains in Texas. It is understood that to meet this condition passengers desiring to use the trains locally in Texas will be required to buy a certificate authorizing them to ride on them.

Chicago Subway Commission's Report.

The Chicago Subway Commission appointed about three months ago by Mayor Harrison to investigate feasible plans for building passenger subways in Chicago, presented a report to the committee on local transportation of the city council on Tuesday morning last, October 31. It was not thought advisable to prepare detailed working plans of the subway before authorization is secured from the council, and the present reports included only such estimates of costs as were necessary to determine the feasibility of various routes proposed. The commission reported that of all the plans presented by former investigating bodies and engineers who have worked on this problem there are none which seem to fill the conditions, and it was thought necessary to disregard practically all data gathered in the past and begin another complete investigation. Considerable data has been secured concerning the capacities of existing local transportation lines and the members of the commission have visited other cities to study the building and operation of subways. The routes proposed are two to connect with the present elevated roads and two for surface street cars. One double track subway is proposed to connect the Northwestern and Metropolitan elevated lines, beginning at Wells and North Water streets, running east in North Water, south in State and west in Harrison, to a connection with the Metropolitan near Halsted and Pearce avenue. A second subway would connect the South Side and Oak Park elevated lines, beginning near Fourteenth street, between State and Wabash, running north in State, west in Randolph and north in Green, to a connection with the Oak Park line. These two routes would occupy a four-track subway in State street, allowing space for transfer stations. It is the intention of the commission that express elevated trains should be operated through these subways, the local trains either continuing to use the present union loop, or the present stub terminals, or modified loops joining the present stub terminals. The present capacity of the elevated lines is estimated at 622 cars an hour on the loop and 293 in the stub terminals, a total of 915 cars. The commission estimates that in the subways 1,600 express cars could be run per hour, and the modified stub terminals an equal number of local cars, a total of 3,200 cars an hour. The estimated cost of these two subways with the necessary changes to existing elevated structures and all incidental expenses is given as $9,812,000. The first subway for surface cars would form a connection between the north and southwest sides of the city, beginning at the north portal of the present La Salle street river tunnel and running south in La Salle, east in Adams, south in Dearborn, and west in Jackson, to a point near Des Plaines street, where it would rise to the surface. The second surface-car subway would connect the south and northwest sides of the city by a line beginning near Sixteenth street and running north in Dearborn, west in Washington, under the river in the present Washington street tunnel, and terminating at the Clinton street portal of that tunnel. These two routes are parallel in a four-track subway for one block on Dearborn street between Adams and Jackson, where transfer stations could be provided. The present capacity of surface car loops in the business district is estimated at 1,037 cars an hour, and of the subway 720 cars an hour. The cost of these two routes is given as $9,328,000. The commission doubts the wisdom of building a subway for surface cars which would cost practically the same amount as the routes proposed for elevated cars, and would have a very much smaller capacity. It is pointed out, however, that the plans made are so arranged that if this subway were built for surface cars, it could be used later for additional elevated cars or as a link in future through rapid transit subways. The plans outlined involve the building of 3.93 miles of double track subway and about one mile of four-track subway. The plans made by the commission call for high level subways throughout, except where it is necessary to dip below a cross line to avoid grade crossings. The top of the proposed subway would be about 3 ft. below the street level and the bottom would clear the present Illinois (freight) tunnels by 13 or 14 feet. The commission estimates that the subway outlined in the present plan could be built in three years. The members of the commission are: John Ericson, E. C. Shankland and J. J. Reynolds.

The Steel Corporation's Third Quarter.

The quarterly statement of the United States Steel Corporation for the three months ended September 30 shows that the total net earnings, after deducting all expenses incident to operations, including those for ordinary repairs and maintenance of plants, and interest on bonds, also fixed charges of subsidiary companies, were $29,522,725. This was better than was expected, even by the most optimistic, who thought that $28,000.000 would not be exceeded.. During the second quarter of 1911, $28,108,520 was earned, and during the first quarter, $23,519,203. In the last quarter of 1910, $25,990,978 was earned, as compared with $37,365,187 for the third quarter of last year. The largest earnings ever reported at the end of a September quarter were $43,804,285, in 1907. The earnings for July, 1911, were $8,750,467, as compared with $10,710,145 in August, and $10,062,113 in September. For the nine months ended September 30, 1911, the earnings have been $81,150,448, a decrease of $34.002,575, as compared with the corresponding period of last year.

A Distant View.

That distance gives accuracy of perspective often impossible to near-by observers is an old truth often illustrated. One of the best criticism on American railway affairs that we ever printed was dated in Nova Zembla. Last week we received the following. "Hong Chang" is not familiar to us; but by a little exercise of the imagination we can discern the water mark "H" in the letter, so it must be genuine.

"HONG CHANG, China, October 25, 1911.

"TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

"We are very much interested, here in China, in the question of state ownership of railways.

"In investigating this matter, I find in the book entitled Statistics of Railways in the United States, issued by the Interstate Commerce Commission, under the heading 'Summary of Railway Mileage Owned in the United States by States and Territories,' 234,799.4 miles so owned.

"On further examination of the book, this appears to be the total mileage of all railways in the United States. There is no other mention of state ownership in this large book.

"Do I correctly understand from this that all the railway mileage in the United States is owned by the states and territories? LI."

We think our correspondent is in error. Our understanding is that there is in this country a large mileage of railways still owned by the stockholders of the railway companies, and, to a

reasonable extent, operated by their representatives. This theory is supported by the fact that in our copy of the book referred to, there is a comma after "United States." It is comforting to think that in spite of all the great responsibilities resting on the shoulders of the Interstate Commerce Commission it still finds time to put in a comma where a comma is due and so, literally by a stroke of the pen, save the railways from government ownership. As we reach this point in our cogitations we notice the date on the letter. Really, it is hard to believe that it got here from China so soon. The time elapsed between the date of its mailing and its receipt in this office was short; as short, for instance, as the time the mail takes to get here from the office of the chairman of the Committee on Relations between Railroads.

The Suit Against the Steel Corporation.

Dissolution of the United States Steel Corporation and its subsidiary companies has been asked for by the government in a suit filed in the United States Circuit Court in New Jersey. The petition charges that the Steel Corporation is an illegal combination in restraint of trade and therefore prohibited by the Sherman anti-trust law of July 2, 1890.

The petition itself consists of ninety-three printed pages in which there is set forth in considerable detail the condition of the iron and steel trade prior and subsequent to the formation of the United States Steel Corporation. It is charged that the illegal monopolies complained of have been brought about by a series of combinations and mergers in which the steel interests of the country were brought under one general control. Further than this it is charged that by a series of interlacing directorates the great business interests of the country with the United States Steel Corporation as the dominant factor have been brought under one influence to crush out competition, maintain prices and control the steel and other business of the United States. The specific relief asked for is:

1. To order, adjudge and decree that the combination and conspiracies and monopolizations of trade and commerce hereinbefore described are unlawful and that all acts done or to be done to carry out the same or any part thereof are in violation of the act of Congress of July 2, 1890, entitled "An act to protect the trade and commerce against unlawful restraint and monopolies."

2. That the defendants and each and every one of them and the officers, directors, stockholders and agents of the defendant corporation and of each and every one of them be perpetually enjoined from doing any act in pursuance of or for the purpose of carrying out the same.

3. That the United States Steel Corporation in and of itself, as well as each and all of the elements composing it, whether separate or individual, whether considered collectively or separately, be decreed to be illegal and in restraint of trade, and an attempt to monopolize and a monopolization within the first and second sections of said act of Congress of July 2, 1890, and that it be dissolved.

4. That each and all of the said constituent or subordinate companies shown, as aforesaid, to have been combined in restraint of trade and commerce and in monopolization of trade or commerce within the meaning of the anti-trust act, each in and of itself, as well as each and all the elements composing each respectively, whether considered collectively or separately, be decreed to be illegal and in restraint of trade, and as an attempt to monopolize and a monopolization within the first and second sections of said act and that each be dissolved.

5. That the holding of stock by any one of the defendant corporations in another of the defendant corporations under the circumstances shown be declared illegal, and that each of them be enjoined from continuing to hold or own such shares and from exercising any right in connection therewith.

6. That the said several defendant corporations shown as aforesaid to be constituents or subsidiaries of the United States Steel Corporation be enjoined and prohibited from declaring or paying any dividend to the said United States Steel Corporation, or to any person or corporation for its use.

7. That it be decreed that the several individual defendants combined each with other persons and corporations to restrain trade and commerce, and to attempt to monopolize, and in monopolizing within the first and second sections of said act and that each of them be enjoined from continuing to carry out the purposes of any of the above described combinations and conspiracies and attempts to restrain commerce and trade, or to monopolize any part of commerce and trade among the states and with foreign nations.

8. That such orders and decrees be made in respect of the stock issued under the several combinations aforesaid as shall be in accordance with equity and good conscience and that such disposition be made of the said various properties as shall effectuate the purposes of the said anti-trust act.

9. That the said lease entered into as aforesaid by the Great Northern interests and the Great Western Mining Company be decreed to be illegal, in restraint of trade and commerce, an attempt to monopolize and a monopolization within the first and second sections of said act and that the same be now cancelled.

10. The United States also prays for such other and further relief as the nature of the case may require and the court may deem proper in the premises.

Chinese Minister Dismissed.

The Chinese minister of posts and communications, Sheng Hsuan-Huai, who negotiated the foreign loan for the national railways, was dismissed from office October 26 by the Peking government, in accordance with the demand made by the National Assembly. Opposition to his railway and reform plans is one of the chief causes of the rebellion in China. He was considered by foreign representatives to be the strongest man in the Chinese cabinet. Tang Shao Yi, who formerly held the position, has been appointed to the vacancy.

Canadian Association of Passenger and Ticket Agents.

The twenty-fifth annual meeting of the Canadian Ticket Agents' Association, which has just been held at Sault Ste. Marie, decided to change the name of the association to that shown at the head of this paragraph. The change makes eligible to membership general, district and traveling passenger agents. Thirty-five new members joined the association. Among the speakers at this meeting were Mr. Callaway, of the Soo Line; Mr. Cumberland; Mr. Elliott, of the Grand Trunk; Mr. Bohreer, of the Mobile & Ohio; Mr. Cairns, of the Chicago & North Western, and Mr. Pond, of the Soo Line.

American Society of Civil Engineers.

At the meeting of the American Society of Civil Engineers held November 1, the following papers were presented for discussion: Some of the Properties of Oil-Mixed Portland Cement Mortar, by Logan Waller Page, Am. Soc. C. E., and Reinforced Concrete Bridge Across the Almendares River, Havana, Cuba, by Eugene Klapp and W. J. Douglas, Am. Soc. C. E. The latter paper was illustrated with lantern slides. These papers were printed in *Proceedings* for September, 1911.

MEETINGS AND CONVENTIONS.

The following list gives names of secretaries, dates of next or regular meetings, and places of meeting.

Air Brake Association.—F. M. Nellis, 53 State St., Boston, Mass.

American Association of Demurrage Officers.—A. G. Thomason, Boston, Mass.

American Association of General Passenger and Ticket Agents.—W. C. Hope, New York; next convention, Seattle, Wash.

American Association of Freight Agents.—R. O. Wells, East St. Louis, Ill. Annual, June 18-21, Chicago.

American Association of Railroad Superintendents.—O. G. Fetter, Carew building, Cincinnati, Ohio; 3d Friday of March and September. Annual, March 17, Chicago.

American Electric Railway Association.—H. C. Donecker, 29 W. 39th St., New York.

American Railway Association.—W. F. Allen, 75 Church St., New York; November 15, Chicago.

American Railway Bridge and Building Association.—C. A. Lichty, C. & N. W., Chicago. Next annual convention, third week in October, 1912, Baltimore, Md.

American Railway Engineering Association.—E. H. Fritch, Monadnock Block, Chicago; annual convention, March 19-21, 1912, Chicago.

American Railway Master Mechanics' Association.—J. W. Taylor, Old Colony building, Chicago. Annual convention, June 12-14, Atlantic City, N. J.

American Railway Tool Foremen's Association.—O. T. Harroun, Bloomington, Ill.

American Society for Testing Materials.—Prof. E. Marburg, University of Pennsylvania, Philadelphia, Pa.

American Society of Civil Engineers.—C. W. Hunt, 220 W. 57th St., New York; 1st and 3d Wed., except June and August, New York.

AMERICAN SOCIETY OF ENGINEERING CONTRACTORS.—J. R. Wemlinger, 13 Park Row, New York; 2nd Tuesday of each month, New York.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS.—Calvin W. Rice, 29 W. 39th St., New York.

ASSOCIATION OF AMERICAN RAILWAY ACCOUNTING OFFICERS.—C. G. Phillips, 143 Dearborn St., Chicago; annual, June 26, 1912, Quebec, Que.

ASSOCIATION OF RAILWAY CLAIM AGENTS.—J. R. McSherry, C. & E. I., Chicago; annual convention, May 22, 1912, Los Angeles, Cal.

ASSOCIATION OF RAILWAY ELECTRICAL ENGINEERS.—Jos. A. Andreucetti, C. & N. W. Ry., Chicago; annual, November 6-10, Chicago.

ASSOCIATION OF RAILWAY TELEGRAPH SUPERINTENDENTS.—P. W. Drew, 135 Adams St., Chicago; annual, June 24, 1912, New York.

ASSOCIATION OF TRANSPORTATION AND CAR ACCOUNTING OFFICERS.—G. P. Conard, 75 Church St., New York; December 12-13, Louisville, Ky.

CANADIAN RAILWAY CLUB.—James Powell, Grand Trunk Ry., Montreal, Que.; 2d Tuesday in month, except June, July and Aug., Montreal.

CANADIAN SOCIETY OF CIVIL ENGINEERS.—Clement H. McLeod, 413 Dorchester St., Montreal, Que.; Thursdays, Montreal.

CAR FOREMEN'S ASSOCIATION OF CHICAGO.—Aaron Kline, 841 North 50th Court, Chicago; 2d Monday in month, Chicago.

CENTRAL RAILWAY CLUB.—H. D. Vought, 95 Liberty St., New York; 2d Thurs. in Jan. and 2d Fri. in March, May, Sept., Nov., Buffalo, N. Y.

CIVIL ENGINEERS' SOCIETY OF ST. PAUL.—D. F. Jurgensen, 116 Winter St., St. Paul, Minn.; 2d Monday, except June, July and Aug., St. Paul.

ENGINEERS' SOCIETY OF PENNSYLVANIA.—E. R. Dasher, Box 704, Harrisburg, Pa.; 1st Monday after 2d Saturday, Harrisburg, Pa.

ENGINEERS' SOCIETY OF WESTERN PENNSYLVANIA.—E. K. Hiles, 803 Fulton building, Pittsburgh; 1st and 3d Tuesday, Pittsburgh, Pa.

FREIGHT CLAIM ASSOCIATION.—Warren P. Taylor, Richmond, Va.; annual May 15, Buffalo, N. Y.

GENERAL SUPERINTENDENTS' ASSOCIATION OF CHICAGO.—E. S. Koller, 226 W. Adams St., Chicago; Wed. preceding 3d Thurs., Chicago.

INTERNATIONAL RAILWAY CONGRESS.—Executive Committee, rue de Louvain, 11 Brussels; 1915, Berlin.

INTERNATIONAL RAILWAY FUEL ASSOCIATION.—D. B. Sebastian, La Salle St. Station, Chicago.

INTERNATIONAL RAILWAY GENERAL FOREMEN'S ASSOCIATION.—L. H. Bryan, Brown Marx building, Birmingham, Ala.

INTERNATIONAL RAILROAD MASTER BLACKSMITHS' ASSOCIATION.—A. L. Woodworth, Lima, Ohio.

IOWA RAILWAY CLUB.—W. B. Harrison, Union Station, Des Moines, Ia.; 2d Friday in month, except July and August, Des Moines.

MASTER BOILER MAKERS' ASSOCIATION.—Harry D. Vought, 95 Liberty St., New York.

MASTER CAR BUILDERS' ASSOCIATION.—J. W. Taylor, Old Colony building, Chicago. Annual convention, June 17-19, Atlantic City, N. J.

MASTER CAR AND LOCOMOTIVE PAINTERS' ASSOCIATION, OF UNITED STATES AND CANADA.—A. P. Dane, B. & M., Reading, Mass. Next annual convention, second week in September, 1912.

NEW ENGLAND RAILROAD CLUB.—G. H. Frazier, 10 Oliver St., Boston, Mass.; 2d Tuesday in month, except June, July, Aug. and Sept., Boston.

NEW YORK RAILROAD CLUB.—H. D. Vought, 95 Liberty St., New York; 3d Friday in month, except June, July and August, New York.

NORTHERN RAILWAY CLUB.—C. L. Kennedy, C., M. & St. P., Duluth, Minn; 4th Saturday, Duluth.

OMAHA RAILWAY CLUB.—H. H. Maulick, Barker Block, Omaha, Neb.; second Wednesday.

RAILROAD CLUB OF KANSAS CITY.—C. Manlove, 1008 Walnut St., Kansas City, Mo.; 3d Friday in month, Kansas City.

RAILWAY CLUB OF PITTSBURGH.—C. W. Alleman, P. & L. E., Pittsburgh, Pa.; 4th Friday in month, except June, July and August, Pittsburgh.

RAILWAY INDUSTRIAL ASSOCIATION.—G. L. Stewart, St. L. S. W. Ry., St. Louis, Mo.; annual, May 12, 1912, Kansas City, Mo.

RAILWAY SIGNAL ASSOCIATION.—C. C. Rosenberg, Bethlehem, Pa.

RAILWAY STOREKEEPERS' ASSOCIATION.—J. P. Murphy, Box C, Collinwood, Ohio.

RICHMOND RAILROAD CLUB.—F. O. Robinson, Richmond, Va.; 2d Monday, except June, July and August.

ROADMASTERS' AND MAINTENANCE OF WAY ASSOCIATION.—L. C. Ryan, C. & N. W., Sterling; September 10, 1912, Buffalo, N. Y.

ST. LOUIS RAILWAY CLUB.—B. W. Frauenthal, Union Station, St. Louis, Mo.; 2d Friday in month, except June, July and Aug., St. Louis.

SOCIETY OF RAILWAY FINANCIAL OFFICERS.—C. Nyquist, La Salle St. Station, Chicago.

SOUTHERN ASSOCIATION OF CAR SERVICE OFFICERS.—E. W. Sandwich, A. & W. P. Ry., Montgomery, Ala.

SOUTHERN & SOUTHWESTERN RAILWAY CLUB.—A. J. Merrill, Grant bldg., Atlanta, Ga.; 3d Thurs., Jan., March, May, July, Sept., Nov., Atlanta.

TOLEDO TRANSPORTATION CLUB.—J. G. Macomber, Woolson Spice Co., Toledo, Ohio; 1st Saturday, Toledo.

TRAFFIC CLUB OF CHICAGO.—Guy S. McCabe, La Salle Hotel, Chicago; meetings monthly, Chicago.

TRAFFIC CLUB OF NEW YORK.—C. A. Swope, 290 Broadway, New York; last Tuesday in month, except June, July and August, New York.

TRAFFIC CLUB OF PITTSBURGH.—D. L. Wells, Erie, Pittsburgh, Pa.; meetings monthly, Pittsburgh.

TRAIN DESPATCHERS' ASSOCIATION OF AMERICA.—J. F. Mackie, 7042 Stewart Ave., Chicago; annual, June 18, 1912, Louisville, Ky.

TRANSPORTATION CLUB OF BUFFALO.—J. M. Sells, Buffalo; first Saturday after first Wednesday.

TRANSPORTATION CLUB OF DETROIT.—W. R. Hurley, L. S. & M. S., Detroit, Mich.; meetings monthly.

TRAVELING ENGINEERS' ASSOCIATION.—W. O. Thompson, N. Y. C. & H. R., East Buffalo, N. Y.; August, 1912.

WESTERN CANADA RAILWAY CLUB.—W. H. Rosevear, P. O. Box 1707, Winnipeg, Man.; 2d Monday, except June, July and August, Winnipeg.

WESTERN RAILWAY CLUB.—J. W. Taylor, Old Colony building, Chicago; 3d Tuesday of each month, except June, July and August.

WESTERN SOCIETY OF ENGINEERS.—J. H. Warder, 1735 Monadnock Block, Chicago; 1st Wednesday in month except July and August, Chicago.

WOOD PRESERVERS' ASSOCIATION.—F. J. Angier, B. & O., Baltimore, Md.; annual, January 16-18, Chicago.

Traffic News.

The through express trains of the Canadian Pacific, between St. Paul and Seattle, are to be continued in service throughout the winter. In former years these trains were run only in the summer season.

The Pennsylvania Railroad this week began its fourth annual season of agricultural promotion by running an educational train over the Pittsburgh and Conemaugh divisions. The train made a tour occupying three days, during which time it stopped at seventeen stations.

The Business Men's League of St. Louis is said to be considering the establishment of a package car service from St. Louis to New York points on the Delaware, Lackawanna & Western, the Delaware & Hudson, the Boston & Maine, and the New York, New Haven & Hartford.

Evidence regarding the effect of the 2-cent passenger rates in the States of Illinois, Indiana and Ohio on the interstate passenger rates in those States, is being obtained by the Central Passenger Association, with a view to testing the validity of the State laws enforcing those rates.

Business men of St. Louis are forming the St. Louis-Gulf Steel Barge Line Company to take over the Mississippi Valley Transportation Company, and run barges on the Mississippi river between St. Louis and the gulf of Mexico. Robert H. Whitelaw has been elected president, and W. K. Kavanaugh, vice-president.

Beginning November 12, through passenger trains will be run from St. Louis and Memphis to Los Angeles and San Francisco over the Atchison, Topeka & Santa Fe and the St. Louis & San Francisco. The route will be from St. Louis or Memphis by the Frisco to Waynoka, Okla., and from there westward over the new Belen cut-off of the Santa Fe, via Amarillo and Albuquerque to California.

The number of colonists arriving at Los Angeles, Cal., this autumn has been greater than in any former season. Reduced fares were very generally availed of. On October 18 the Atchison, Topeka & Santa Fe took into that city 67 extra passenger cars, all well loaded, and the San Pedro, Los Angeles & Salt Lake 40 extra cars. The Southern Pacific took in eight extra trains.

The American Hawaiian Steamship Company has let contracts for five new freight steamers, which will make its total fleet 23 vessels. This line, in connection with the Tehuantepec Railway, carries freight between Pacific ports and the Atlantic seaboard in nearly as short a time as that taken by the transatlantic railways. The new vessels will be of 9,000 tons each, which is larger than any of the present vessels.

Two hundred prominent shippers of New England met in Boston last week and adopted a set of resolutions, to be sent to the American Railway Association and to the Interstate Commerce Commission, asking that the demurrage bureau in that city, which was established at the request of the commission a few months ago, be continued, and that Mr. Thomason be retained at the head of it. These shippers also ask for various concessions, including an additional allowance of free time for unloading certain kinds of freight.

The Northwest Development League, St. Paul, is to run a special demonstration train, starting November 27, through the eastern states, for the purpose of acquainting the people with the agricultural resources of the Northwest. The train will run from St. Paul to Chicago over the Burlington route, from Chicago to New York over the New York Central, from New York to St. Louis over the Pennsylvania, and from St. Louis to St. Paul over the Burlington, visiting all the important cities on the way and covering a distance of about 5,000 miles. The train will consist of four exhibition cars containing farm products from eight northwestern states, one observation car, two sleeping cars, one baggage car and one diner. The train will return to St. Paul in time for the Northwestern Land Products Show, which is to be held in that city from December 12 to 23, inclusive.

The American Express Company has offered to put into effect in Indiana its Michigan tariffs, which, it is estimated, would mean a reduction of approximately 15 per cent. in the earnings of the company on Indiana business. Representatives of the company said if the Michigan schedule were adopted and the present service and business continued, it would lose money, but they expected to cut down expenses to meet the proposed reduction and also to get more business. Accountants employed by the state commission have estimated that this company is making an annual profit of 101.75 per cent. on its business in Indiana, while the assistant traffic manager of the company submitted figures showing that on its intrastate business it was making a profit of only 4 per cent. The difference in the percentages is due to difference of opinion as to the proper working basis for the computations.

The second hearing at Chicago before the Interstate Commerce Commission in its general investigation into rates on wool, hides and pelts from western to eastern territory was concluded on October 27, and the case was opened at Boston before C. A. Prouty of the commission on October 30. At Chicago representatives of St. Louis shippers complained of excessive difference between carload and less-than-carload rates from Texas points to St. Louis. Traffic officers representing all the western lines were heard. Several statements supporting pending applications for relief from the operation of the fourth section of the Interstate Commerce act were filed, and arguments were presented regarding transit privileges and the difference that should be allowed between baled and sacked wool and between wool in grease and scoured wool. At Boston the wool merchants claimed that the rates on wool were far in excess of those for other commodities, and that there should be a reduction which should apply to wool, mohair, pelts and hides. They also protested against the rates east of the Mississippi. They classed the rates as high as compared with the rates to Chicago and Detroit.

INTERSTATE COMMERCE COMMISSION.

The state railway commission of Indiana has filed at Washington a complaint against the freight rates of the Wabash and the Toledo, St. Louis & Western from Indiana to points on the Missouri river. It is claimed that these rates are unreasonably high, as compared with rates to the same destinations from Chicago.

Intervening petitions, joining with the petition of the Chicago Association of Commerce, have been filed with the Interstate Commerce Commission by commercial organizations of San Francisco, St. Louis, Indianapolis, and Cincinnati, Springfield and Dayton, Ohio, asking for a suspension of the advances in class rates to the Pacific coast which were filed by the transcontinental roads to become effective November 1.

The commission has suspended until February 28 certain proposed increased rates on apples over western trunk lines. Rates on cotton and cotton linters proposed by the St. Louis Southwestern in Louisiana, effective November 2, have been suspended until March 1. Rates on iron and steel products proposed to be increased November 6 by the Pere Marquette and connecting roads have been suspended until February 29.

Hearings on a proposed advance of 3 cents a ton in the rate on bituminous coal from the Harrisburg district, a territory covering some 12 miles in Saline County, Ill., to Chicago, the traffic passing into Indiana in transit, were finished in Chicago last week. An effort was made by the Cleveland, Cincinnati, Chicago & St. Louis last July to raise the rate from $1.02 to $1.05 per ton, but the new rate was suspended by the commission pending a hearing. Representatives of the Chicago & Eastern Illinois, the St. Louis, Iron Mountain & Southern, and the Illinois Central testified in support of the application of the C. C. C. & St. L. Evidence was also presented regarding an increase in rates on coal from the same district to Milwaukee, which increase will take place if the 3-cent advance to Chicago is allowed by the commission.

The commission this week listened to long arguments in the cases involving freight rates from the Atlantic seaboard westward, on merchandise imported from Europe. Baltimore shippers are complaining because the rates from that city are not lower than those from Boston and Philadelphia. The rates from New York are higher than from any of these other cities, three-fourths of all the import traffic, according to one of the witnesses, going through New York. When something was said about New York interests desiring delay, one of the lawyers on the other side observed that New York had had 30 years in which to prepare her case and therefore should be ready. Representatives of Boston said that while that city was not getting what it ought to have, still the tentative rates which have been in effect during the past year would be accepted without objection.

Demurrage on Car Held for Consignee's Order.

B. F. Roden Grocery Co. v. Alabama Great Southern. Opinion by the commission:

A carload of canned goods was shipped from Troutville, Va., to Birmingham, Ala., under an "order-notify" bill of lading. Delivering carrier placed the car on its team track, where, after notice, the car was held subject to consignee's order. Under such conditions the car was liable to demurrage charges after the lapse of 24 hours free time allowed for reconsignment or switching orders. (21 I. C. C. 469.)

Higher Cream Rates Refused.

Ohio Allied Milk Product Shippers v. Erie. Opinion by Chairman Clements:

Carriers from dairying districts of Ohio and Indiana, eastward to Pittsburgh, supplying domestic cream and condensed milk at Pittsburgh and centralizer cream at various intermediate centralizers, have applied for many years uniform rates to raw milk, cream, and condensed milk. By tariffs now under suspension it is proposed to increase the rates on cream and condensed milk approximately 50 per cent. over the present raw-milk rates. Without suggesting any rule of general application as to the relation that should exist between the rates on these respective commodities under the varying conditions that may obtain in different territories; it is held that on the particular facts and conditions disclosed by the present record the carriers have failed to sustain the burden of proof cast upon them by the amended law to show by competent evidence of justifying transportation conditions throughout the territory affected that the proposed increased rates are reasonable and just.

Greater value alone is not conclusive of the reasonableness of a higher rate of freight on a given article than on another commodity of the same general character, especially when all the incidents of transportation thereof except value are identical in the transportation of the less valuable commodity. (21 I. C. C. 522.)

Relation of Rates on Live Hogs and Hog Products.

T. M. Sinclair & Co. v. Chicago, Milwaukee & St. Paul et al. Opinion by Commissioner Clark:

Complaint alleges unjust discrimination against complainant, against Cedar Rapids, Iowa, and against the commodities, fresh meats, and other packing-house products from slaughtered hogs, in that defendants' charges for transportation of live hogs from points in Iowa to New York, Boston, etc., are lower than the charges for the transportation of the dressed meat and products of hogs.

Rates on live hogs west of the Mississippi river and west of Chicago are as a rule the same as or higher than the products rates. On the lines east of the Mississippi river and east of Chicago, the rates on the products are higher than on the live hogs, and this fact is alleged to result in unjust discrimination against the products. It is alleged that defendants have undertaken to establish and undertake to maintain commercial parity between complainant and eastern packers regardless of natural conditions, location, or commercial advantage, and without regard to cost of service to the carriers.

There is competition between complainant and packers located at New York, Boston, etc., and the defense here is that the rates complained of are adjusted to encourage commerce. The issue is purely one of discrimination. No complaint is made as to the

unreasonableness of any rate *per se*, and no showing is tendered that any rate is too high. On the contrary, it is suggested by complainant that the rates on live hogs to the east be raised. The commission is without power to order an increase in any rate. Packers at Missouri river points, at Chicago, New York, and at Boston have not been heard in this proceeding. There should be a definite relationship between the rates on live hogs and on the products thereof based on transportation conditions and not on commercial equality, but on the issues here presented and in the absence of vitally interested parties as well as the absence of allegation that any particular rate is unreasonable, no finding can here be made as to that relationship.

In the purchase of live animals as well as in marketing the several products thereof, there is active, actual, and keen competition between the packers at the Missouri river points and those at Chicago and complainant, and it is unjustly discriminatory against complainant for defendants to maintain a greater spread between their rates on cured meats in boxes and cured meats in bulk, bogs, or crates or between cured meats in boxes and fresh meats, from Cedar Rapids to New York and New York rate points, or from Cedar Rapids to Boston and Boston rate points, than they contemporaneously maintain in the rates from Missouri river points, or from Chicago to New York and New York rate points, and to Boston and Boston rate points. (21 I. C. C., 490.)

STATE COMMISSIONS.

For probable changes in the Canadian commission see note in General News.

The Indiana Commission has cost the state during the past fiscal year $33,358, and has turned into the state treasury $1,919.

The Indiana Commission has begun a prosecution of the Cleveland, Cincinnati, Chicago & St. Louis for a violation of the full crew law, in counting as the member of a train crew a negro porter, who, on examination, was found to be not qualified for the train duties to which he was assigned.

The Railroad Commission of Louisiana has issued a notice to all railway companies in Louisiana pointing out that it is their duty, when running passenger excursions, to provide an adequate number of coaches to conveniently accommodate the travel on such trains, and that the failure of a railway to so provide for its patrons, when reported to the commission, will be punishable by a fine.

The railway commission of Alabama has issued a supplement to its freight classification requiring that stoves, when shipped in less than carload lots, shall be crated. The president of the board of commissioners, Mr. Henderson, voted against the order, holding that stoves can be satisfactorily handled by the railways without putting the shippers to the expense of providing crates. The railways have been very persistent in their demand that the crating order should be issued and it is said that they are demanding a similar order in the states of Virginia, North Carolina, Georgia, Kentucky and Tennessee.

COURT NEWS.

The Commerce Court has adjourned sine die, after having taken under advisement the lumber reparation cases.

A decision of the Supreme Court of the United States, sustaining the federal safety appliance laws, is noticed in the editorial columns.

The Commerce Court has denied the petition of the Denver & Rio Grande et al for a temporary injunction setting aside the order of the Interstate Commerce Commission in the Salt Lake cases.

The Texas Supreme Court on October 25 refused a writ of error in the Galveston-Houston differential case, which was appealed from the court of civil appeals in Travis county. The lower court decided in favor of Galveston interests in their contention that freight rates from inland Texas points to that city should be the same as from the inland points to Houston, and that the differential of 6 cents between the rates to those points should be abolished. The state supreme court now upholds the decision of the lower court.

Railway Officers.

ELECTIONS AND APPOINTMENTS.

Executive, Financial and Legal Officers.

James Glynn has been appointed general attorney of the Nevada-California-Oregon and the Sierra & Mohawk, with office at Reno, Nev., succeeding N. J. Barry.

R. W. Leonard, of St. Catharines, Ont., has been appointed chairman of the National Transcontinental Railway Commission (Canada), succeeding S. N. Parent, resigned.

P. J. Flynn, freight traffic manager of the Delaware, Lackawanna & Western, at New York, has been elected vice-president in charge of traffic, succeeding B. D. Caldwell, resigned to become president of Wells-Fargo & Co., as has already been announced in these columns.

D. R. Burbank, assistant secretary of the Illinois Central, at New York, has been elected secretary. The duties of secretary, have for some time been performed by Vice-President A. G. Hackstaff.

E. M. Alvord, vice-president and general manager of the Midland Valley, having resigned, J. W. McLoud, general solicitor, has been appointed also assistant to the president, with office at Muskogee, Okla., succeeding Mr. Alvord.

As has been announced in these columns, T. O. Edwards, auditor of Morgan's Louisiana & Texas R. R. & S. S. Company, has been appointed auditor of freight accounts of the Southern Pacific, with office at San Francisco, Cal., in which position he succeeds D. W. Horsburgh, retired under the pension rules of the company, and the office of assistant auditor of freight accounts has been abolished. J. C. Vinson has been appointed auditor of miscellaneous accounts, with office at San Francisco. C. C. Barry, recently appointed auditor of the Texas & New Orleans at Houston, Tex., has been appointed auditor of the Louisiana lines of the Southern Pacific, succeeding Mr. Edwards.

Newman Erb, whose election as president of the Minneapolis & St. Louis and the Iowa Central, has already been announced in these columns, is best known as a dealer in railways. In 1903 Mr. Erb formed a syndicate to buy the Cincinnati, Hamilton & Dayton, which then took over the Pere Marquette, and the two roads were later sold to J. P. Morgan & Co., and shortly after went into the hands of receivers. Mr. Erb was born in 1850, and was educated in the primary and high schools of St. Louis, Mo. He was admitted to the bar in 1872. In 1881 he became identified with the construction of the Memphis extension of the Kansas City, Fort Scott & Gulf Railroad, now part of the Frisco system; he became a director and was given charge of its law department for Arkansas and Tennessee. He obtained the charter for the Mississippi river bridge at Memphis, Tenn., and was identified with its construction. In 1886 he was appointed receiver of the unfinished Memphis, Selma & Brunswick, which he completed from Memphis to Holly Springs, Miss., and later, when the road was taken over by the Kansas City, Fort Scott & Memphis, he was identified with its extension to Birmingham, Ala., as the Kansas City, Memphis & Birmingham. For a time he was a director and had charge of the law department of the latter. In 1885 he organized and became president of the Western Telegraph Company and built a connection with the Baltimore & Ohio Telegraph Company, bringing that line into Memphis. In 1886 he began to build the Kansas City, Wyandotte & Northwestern, which he completed from Kansas City to Virginia, Neb., with several branch lines; he became vice-president, later president, and subsequently receiver. The property was bought by Jay Gould and is now part of the Missouri Pacific system. In 1892 Mr. Erb removed to New York and, acting for clients, bought the Meriden & Connecticut River, of which he was made vice-president, and which later was absorbed by the New York & New England, now part of the New York, New Haven & Hartford. In 1896 he acquired control of the St. Louis, Cape Girardeau & Western and several small lines in southeastern Missouri and northwestern Arkansas, which he combined, and then headed a syndicate which extended the line to St. Louis and Memphis, Tenn., making the shortest line between those points on a water

level. He sold the road, over 600 miles, to the St. Louis & San Francisco, of which it now forms a part. Two years later Mr. Erb with F. H. Prince, of Boston, formed a syndicate which acquired control of the Pere Marquette, of which he was assistant to the president. The same year he formed a syndicate and acquired control of the Wisconsin Central, but retired from the syndicate, and in 1908 again came into control of that property, selling it in 1909 to the Minneapolis, St. Paul & Sault Sainte Marie. In 1902 Mr. Erb was appointed temporary receiver of the Chattanooga Southern, and has been a director of that company ever since its reorganization. Recently he acquired full control of this property. He is now president of the Tennessee, Alabama & Georgia Railroad, the successor company. In 1904 he came into control of some twenty different public service corporations in various parts of the country, and in 1910 Mr. Erb with his friends came into control of the Ann Arbor Railroad, of which he is chairman of the board. On October 9, 1911, he was elected president of the Minneapolis & St. Louis, and president of the Iowa Central.

Operating Officers.

S. S. Russell has been appointed superintendent of car service of the Central of Vermont, with office at St. Albans, Vt.

D. Dale has been appointed acting superintendent of the Missouri & Louisiana, with office at Bevier, Mo., succeeding D. S. Jones, resigned.

T. W. Cardwell, trainmaster of the Louisville & Nashville, at Nashville, Tenn., has been appointed trainmaster at Knoxville, succeeding H. W. Brownlie, deceased.

E. Gaynor, assistant yardmaster of the St. Louis & San Francisco at New Orleans, La., has been appointed trainmaster of the Florida East Coast, with office at St. Augustine, Fla.

F. N. Reynolds, trainmaster of the Chicago Great Western at St. Paul, Minn., has been appointed superintendent of terminals at Oelwein, Iowa, succeeding P. B. Vermillion, assigned to other duties.

S. H. Barnes, until about two months ago superintendent of the Denver & Rio Grande at Alamosa, Colo., has been appointed superintendent of transportation of the Midland Valley, with office at Muskogee, Okla., a new position.

C. C. Riley, general superintendent of the Kansas City Southern, with office at Kansas City, Mo., has retired, effective November 15, and O. Cornelisen, superintendent of the Northern division, at Pittsburg, Kan., has resigned to accept a position with the Virginian Railway at Princeton, Va.

Edwin C. Keenan, superintendent of telegraph of the Lake Shore & Michigan Southern at Cleveland, Ohio, has been appointed also superintendent of telegraph of the Lake Erie & Western, the Fort Wayne, Cincinnati & Louisville, the Northern Ohio, the Toledo & Ohio Central and the Zanesville & Western, succeeding on the first three roads C. S. Rhoads; and he will jointly represent all six companies and the Western Union Telegraph Company, with office at Cleveland.

P. C. Allen, superintendent of the Northern division of the Great Northern at Crookston, Minn., has been appointed superintendent of the Dakota division, with headquarters at Grand Forks, N. D., succeeding M. H. Murtha, assigned to other duties. R. L. Knebel, superintendent of the Sioux City division, with headquarters at Sioux City, Iowa, succeeds Mr. Allen. Jos. Lindsay, trainmaster at Great Falls, Mont., succeeds Mr. Knebel. M. H. Murtha has been appointed trainmaster of the terminals division, with headquarters at Minneapolis, Minn., succeeding S. J. O'Gara, who has been transferred, as trainmaster to the Dakota division, with headquarters at Grand Forks, N. D.; succeeding P. C. Connelly, granted indefinite leave of absence on account of ill-health. John J. Hess has been appointed trainmaster of the Butte division at Great Falls, Mont., succeeding Joseph Lindsay, promoted.

W. T. Lechlider, whose appointment as assistant superintendent of the Baltimore & Ohio, at Cleveland, Ohio, has been announced in these columns, began railway work on April 1, 1883, with the Baltimore & Ohio as a messenger at Mt. Claire, Baltimore, Md., and since that time has been in the continuous service of that company. After learning telegraphy he became a clerk and operator at Baltimore, and in August, 1885, was promoted to train despatcher. In 1897, he was appointed a chief clerk in the operating department, and about three years later he was made chief clerk to the general superintendent at Pittsburgh, Pa., and was promoted in November, 1903, to assistant to the general superintendent of transportation. Mr. Lechlider was later appointed a special representative of the general manager, and in December, 1910, was promoted to inspector of transportation at Baltimore, Md., which position he held at the time of his recent appointment as assistant superintendent, as above.

Traffic Officers.

Paul J. Fischer has been appointed traveling freight agent of the Wabash, with office at Memphis, Tenn.

W. F. Beyreiss has been appointed advertising agent of the Queen & Crescent, with office at Cincinnati, Ohio.

G. B. Boone has been appointed a commercial agent of the Angelina & Neches River, with office at St. Louis, Mo., succeeding J. B. Chipman, resigned.

A. Traynor, general baggage agent of the Union Pacific and the Oregon Short Line at Council Bluffs, Iowa, has had his office removed to Omaha, Neb.

E. L. Strawser has been appointed soliciting freight and passenger agent of the Norfolk & Western, with office at Cincinnati, Ohio, succeeding H. G. Grant, promoted.

J. S. Wood has been appointed assistant general freight agent of the Lehigh Valley, with office at New York City, succeeding R. K. Barton, resigned, to go to another company.

William Humphreys, soliciting freight agent of the Southern Railway at Louisville, Ky., has been appointed commercial agent, with office at Dallas, Tex., succeeding Walter Shipley, promoted.

Herbert Thompson has been appointed assistant general freight agent of the Erie Railroad, with office at Buffalo, N. Y., and C. W. Clark, division freight agent at Buffalo, has been assigned to other duties and his former position has been abolished.

J. W. White has been appointed a commercial agent of the Georgia Southern & Florida, with office at Tampa, Fla., succeeding George H. Robinson, resigned, and John C. Lettice has been appointed soliciting freight agent, with office at Macon, Ga., succeeding J. T. Livsey, transferred.

George A. Cullen, general passenger agent of the Delaware Lackawanna & Western, at New York, has been appointed passenger traffic manager, with office at New York, and W. F. Griffitts, chief clerk in the passenger department, has been made assistant general passenger agent, with office at New York.

Frank J. Watson, division freight agent of the Grand Trunk, at Montreal, Que., has been appointed assistant general freight agent, with office at Montreal. G. I. Pettigrew, division freight agent at Stratford, Ont., succeeds Mr. Watson and R. J. S. Weatherston succeeds Mr. Pettigrew. James Waugh has been appointed a commercial agent at Omaha, Neb., succeeding Allan Wallace, resigned.

George H. Smitton, general agent of the Great Northern at Minneapolis, Minn., has been appointed assistant general freight agent, with office at Portland, Ore., succeeding Archibald Gray, resigned, to become general freight agent of the Western Pacific. W. A. Prinsen, general agent at Bellingham, Wash., has been transferred to Minneapolis, succeeding Mr. Smitton, and C. D. Thompson, general agent at Helena, Mont., succeeds Mr. Prinsen.

James Stuart, commercial agent of the Texas & Pacific and the International & Great Northern at Denver, Colo., has been appointed commercial agent of the Texas & Pacific, with office at Pittsburgh, Pa., reporting to the assistant general freight agent at St. Louis. He will look after the solicitation of traffic in West Virginia and in parts of Pennsylvania and Ohio. P. B. Doddridge, traveling freight agent at St. Louis, succeeds Mr Stuart at Denver.

John H. Crawford, assistant freight traffic manager of the Delaware, Lackawanna & Western, at New York, has been appointed freight traffic manager, with office at New York, succeeding P. J. Flynn, who becomes vice-president. Nat Duke,

general freight agent at New York, succeeds Mr. Crawford; A. S. Learoyd, assistant general freight agent at New York, succeeds Mr. Duke; J. B. Keefe, division freight agent at Scranton, Pa., succeeds Mr. Learoyd; E. C. Campbell, commercial agent at Cleveland, Ohio, succeeds Mr. Keefe, and M. J. Naughton, succeeds Mr. Campbell. See item under Executive, Financial and Legal Officers.

W. O. Warthen, who was recently appointed assistant general passenger agent of the Chesapeake & Ohio, with office at Richmond, Va., as has been announced in these columns, was born on March 26, 1866, at Richmond, and was educated in the public schools. He began railway work in September, 1884, with the Chesapeake & Ohio, and for three years was in the accounting department. He was then for 15 years clerk, and later chief clerk to the division passenger agent at Richmond, and the following nine years was district passenger agent at the same place, which position he held at the time of his recent appointment as assistant general passenger agent of the same road.

Elmer H. Wood, general freight agent of the Union Pacific at Omaha, Neb., has been appointed freight traffic manager, with office at Omaha, succeeding J. A. Munroe, recently elected vice-president in charge of traffic. Charles J. Lane, first assistant general freight agent at Omaha, succeeds Mr. Wood as general freight agent, with jurisdiction over all parts of the road except the main line from Kansas City to Denver and branch lines in Kansas. Henry G. Kaill, assistant general freight and passenger agent at Kansas City, Mo., has been appointed general freight and passenger agent, with office at Kansas City, in charge of the main line from Kansas City to Denver and branch lines in Kansas.

H. K. McEvoy, general agent in the passenger department of the Chicago & Alton at Chicago, has been appointed assistant general passenger agent, with office at Chicago. Mr. McEvoy was born in Chicago August 29, 1869, and finished his education at Beloit College, Beloit, Wis. He began railway work in 1890 as stenographer to the treasurer of the Wisconsin Central, now the Minneapolis, St. Paul & Sault Ste. Marie, at Milwaukee, Wis., and two years later was made a statistician with the Chicago & Northwestern at Chicago. He was appointed secretary to the general passenger agent of the Chicago & Alton in 1896, and in January, 1910, was promoted to city passenger agent at Chicago. In January, 1911, he was made general agent in the passenger department, which position he held at the time of his promotion as above.

Archibald Gray, who has been appointed general freight agent of the Western Pacific, with office at San Francisco, Cal., as has been announced in these columns, was born in 1863 in Argyleshire, Scotland. He received a common school education and began railway work as a night baggageman at Minneapolis in 1881 with the St. Paul, Minneapolis & Manitoba, now the Great Northern. All of his railway experience until the time of his recent appointment on the Western Pacific had been with the Hill lines. He was in the local freight office at Minneapolis for nine years from 1881, was in yard service two years, then local agent for a year, and from 1893 to 1894, chief clerk in the traffic department. In the latter year he was promoted to assistant general freight agent, which office he also held for two years at St. Paul, for nine years at Butte, Mont., one year at Sioux City, Iowa, four years at Seattle, Wash., and since April last has been at Portland, Ore., with the title assistant general freight and passenger agent.

C. A. Hayes, whose appointment as freight traffic manager of the Grand Trunk, with office at Montreal, has been announced in these columns, was born on March 10, 1865, at West Springfield, Mass., and was educated at Amherst College. He began railway work in 1882, and for two years was a clerk in the freight accounting department of the Connecticut River Railroad, and was then chief clerk in the freight accounting department of the Boston & Lowell, these roads are now a part of the Boston & Maine. From October, 1887, to November, 1890, he was chief clerk in the general freight office of the same road and the Boston & Maine. He was then appointed general passenger agent of the Central New England & Western, now a part of the Central New England, and from June to October 15, 1892, was division freight agent of the Philadelphia & Reading, and was then New England agent of the National Despatch Fast Freight Line until June, 1896, when he became New England agent and acting general manager, and in July, 1899, he was made manager of the same line. In April, 1902, he was appointed manager of the National Despatch-Great Eastern line. Mr. Hayes was appointed assistant general freight agent of the Grand Trunk in May, 1903, and since May, 1908, was general freight agent of the same road.

Engineering and Rolling Stock Officers.

J. H. Knowles, division engineer of the Western Pacific at Elko, Nev., has been appointed bridge engineer, with office at San Francisco, Cal.

H. H. Hale, whose appointment as superintendent of motive power of the Cincinnati, Hamilton & Dayton, with office at Cincinnati, Ohio, has been announced in these columns, was born in Minnesota on October 27, 1871. He received a high school education, after which he took private courses in mechanics, and began railway work in 1888 with the Chicago & North Western as a shop apprentice. He was later machinist on the Chicago, St. Paul, Minneapolis & Omaha, and then, consecutively, air brake instructor on the Duluth & Iron Range, and assistant master mechanic of the Southern Pacific. Mr. Hale next went with the Pere Marquette as master mechanic, and subsequently held the same title on the Gulf & Ship Island and the Cincinnati, Hamilton & Dayton. For some months prior to his recent promotion he was on leave of absence from the latter road, doing special work for the Ralston Steel Car Company.

H. H. Hale.

Harold B. Hayes, whose appointment as master mechanic of the Alabama Great Southern, with office at Birmingham, Ala., has been announced in these columns, was born on September 13, 1882, in Alabama, and was educated at Birmingham. He began railway work in 1895 as an apprentice in the master mechanic's office of the Southern railway, and in 1900 was transferred in the same capacity to Atlanta, Ga. Three years later he went to the Missouri Pacific as roundhouse foreman at Little Rock, Ark., and was then appointed general foreman of the Arkansas division at McGehee. In 1906 he was appointed general foreman of the Cincinnati, New Orleans & Texas Pacific, at Danville, Ky., and was promoted to master machanic in November, 1910, with office at Chattanooga, Tenn., which position he held at the time of his recent appointment as master mechanic of the Alabama Great Southern, as above noted.

Harold B. Hayes

I. F. Stern, engineer of bridges of the Chicago & North Western, with office at Chicago, has resigned, and will open

an office as consulting civil engineer in the Old Colony building, Chicago.

J. F. Deems, general superintendent of motive power, rolling stock and machinery, of the New York Central Lines at New York City, has resigned to become president of the Ward Equipment Company. (See page 929.)

L. W. Smith, signal inspector of the Chicago, Milwaukee & St. Paul, at Milwaukee, Wis., has been appointed signal engineer of the Chicago, Milwaukee & Puget Sound, with office at Tacoma, Wash.

J. F. Prendergast, formerly for ten years master mechanic at the Baltimore & Ohio shops at Pittsburgh, Pa., has been appointed master mechanic of the East Broad Top Railroad & Coal Co., also of the Rockhill Iron & Coal Co., with office at Orbisonia, Pa.

Charles J. Scudder, master mechanic of the Pere Marquette at Saginaw, Mich., has resigned to become a district boiler inspector of the Interstate Commerce Commission. As has been announced in these columns. F. C. Pickard has been appointed master mechanic at Saginaw, succeeding Mr. Scudder.

W. C. Stears, master mechanic of the Lima district of the Cincinnati, Hamilton & Dayton at Lima, Ohio, has been appointed master mechanic of the Indianapolis and Springfield divisions, with office at Moorefield (near Indianapolis), Ind., succeeding F. C. Pickard, resigned to go with the Pere Marquette. J. R. Greiner succeeds Mr. Stears.

Purchasing Officers.

G. A. Hickok has been appointed purchasing agent of the Missouri, Kansas & Texas, with office at St. Louis, Mo., succeeding A. I. Miller, deceased. J. M. Gibbons, general store keeper at Parsons, Kan., has been appointed also tie and timber agent, and J. H. Hibben, fuel agent at Parsons, has been appointed superintendent of mines and fuel agent.

OBITUARY.

C. J. Lantry, a railway contractor, of Kansas City, Mo., who built the Pike's Peak Railway, died October 26 at Asheville, N. C., at the age of 48 years.

Carroll Wright, attorney for the Rock Island Lines in Iowa and South Dakota, with office at De Moines, Iowa, died at Colorado Springs, Colo., on October 28.

L. W. Goode. of New York City, president of the Cairo & Norfolk, an eleven-mile railway in Kentucky, died in the Parker House, Boston, Mass., on October 25. The newspapers say it was a case of suicide. Mr. Goode at the time of his death was 55 years old, and had been interested in railway development and timber lands for many years.

W. A. Church, formerly treasurer of the Philadelphia & Reading, died on October 26 at his home in Germantown, Pa. Mr. Church was born February 16, 1834, at Albany, N. Y., and began railway work in 1857. He was successively coal traffic accountant, assistant to treasurer, assistant treasurer, and, to March, 1904, treasurer of the Philadelphia & Reading Railroad, and its successor, the Philadelphia & Reading Railway. He was also treasurer of the Philadelphia & Reading Coal & Iron Company, and many affiliated companies.

Isaac Tillman Dyer, since January, 1905, superintendent of telegraph of the San Pedro, Los Angeles & Salt Lake, with office at Los Angeles, Cal., died at that place on October 25. Mr. Dyer was born August 21, 1860, at La Grange, Mo., and began railway work as operator and agent on the St. Louis, Keokuk & Northwestern, now the Chicago, Burlington & Quincy. He was later operator of the Western Union Telegraph Company at Quincy, Ill., and at St. Joseph, Mo. In June, 1887, he was made superintendent of telegraph of the Hannibal & St. Joseph and the Kansas City, St. Joseph & Council Bluffs, now parts of the Burlington, and held that office until the latter part of 1904, when he went with the San Pedro, Los Angeles & Salt Lake as chief despatcher and trainmaster. On January 1, 1905, he was promoted to superintendent of telegraph of that road and of the Western Union Telegraph Company.

Equipment and Supplies.

LOCOMOTIVE BUILDING.

The Adirondack & St. Lawrence has ordered one locomotive from the Baldwin Locomotive Works.

The Wichita Falls is said to be in the market for 8 locomotives. This item has not been confirmed.

The Virginia & Southwestern has ordered an additional mikado locomotive from the Baldwin Locomotive Works.

The Portland Terminal Company is said to have ordered 4 locomotives from the American Locomotive Company. This item has not been confirmed.

The Grand Trunk has ordered 10 switching locomotives from the Montreal Locomotive Works and 10 consolidation locomotives from the American Locomotive Company.

The New Orleans Great Northern has ordered two 10-wheel locomotives from the American Locomotive Company. The dimensions of the cylinders will be 20 in. x 26 in.; the diameter of the driving wheels will be 61 in., and the total weight in working order will be 167,000 lbs.

The Canadian Northern has ordered 31 ten-wheel passenger locomotives and 20 ten-wheel freight locomotives from the Montreal Locomotive Works. The passenger locomotives will have 22 in. x 26 in. cylinders, 63 in. driving wheels, and in working order will weigh 172,000 lbs. The freight locomotives will have 20 in. x 24 in. cylinders, 57 in. driving wheels, and in working order will weigh 145,000 lbs.

CAR BUILDING.

The Canadian Northern has ordered 1,000 box cars from the Nova Scotia Car Company.

The Grand Trunk is negotiating with the Pressed Steel Car Company for 2,000 box cars.

The Northern Pacific is in the market for 50 center sills for the reinforcement of 40-ton cars.

The Pittsburgh & Lake Erie has ordered 3,000 box cars from the Pressed Steel Car Company.

The Wichita Falls is said to be in the market for 300 box cars. This item has not been confirmed.

The Iroquois Iron Company, South Chicago, Ill., is in the market for 10 all-steel 50-ton coal cars.

The Chesapeake & Ohio has ordered 2,000 all-steel hopper cars from the Standard Steel Car Company.

The Chicago, Burlington & Quincy has ordered 500 gondola cars from the American Car & Foundry Company.

The Texas & Pacific Coal Company, Thurber, Tex., is negotiating with the Pressed Steel Car Company for 100 gondola cars.

The Arms Palace Horse Car Company, Chicago, mentioned in the *Railway Age Gazette* of October 20 as having ordered 3 special horse cars from the Pullman Company has increased this order to 6.

The Baltimore & Ohio, mentioned in the *Railway Age Gazette* of October 27 as being in the market for 1,500 composite gondola cars and 1,000 box cars, is now also in the market for 2,000 all-steel gondola cars.

The Pittsburgh Coal Company, Pittsburgh, Pa., mentioned in the *Railway Age Gazette* of October 27 as being in the market for 1,200 coal cars, is in the market for center sills for 1,000 cars, but is not considering buying any cars.

The Delaware, Lackawanna & Western, mentioned in the *Railway Age Gazette* of October 13 as being in the market for 1,000 steel underframes, is now considering sending 1,000 miscellaneous freight cars to car builders to be reinforced, and is not in the market for underframes.

The Illinois Central is in the market for ten 60-ft. postal cars, seven 70-ft. baggage and mail cars, nine 70-ft. baggage and smoking cars, 26 70-ft. baggage cars, four 70-ft. cafe and coach cars, four 70-ft. parlor cars, four 70-ft. dining cars, ten 70-ft. chair cars, and 40 70-ft. coaches. The cars will all have steel underframes.

THE PENNSYLVANIA RAILROAD, as mentioned in the *Railway Age Gazette* of October 6, has ordered 850 gondola cars and 300 hopper cars from the Cambria Steel Company. The gondola cars will have a capacity of 50 tons and will weigh 48,400 lbs. Their inside measurements will be 40 ft. 8 in. long, 8 ft. 9 in. wide and 2 ft. 6 in. high. Their over-all measurements will be 43 ft. long, 10 ft 7/8 in. wide and 6 ft. 4 3/8 in. high. The bodies will be of wood and underframes of steel. The hopper cars will have a capacity of 55 tons and will weigh 39,000 lbs. Their inside measurements will be 30 ft. 5 in. long and 9 ft. 6 in. wide. Their over-all measurements will be 32 ft. 3 in. long, 10 ft. 1 3/8 in. wide and 10 ft. high. Both the bodies and underframes will be of steel. The special equipment of these cars will be as follows:

	Gondola.	Hopper.
Axles	5½ in. x 10 in.	5½ in. x 10 in.
Bolsters, body	Built up.	Built up.
Bolsters, truck	Pressed or cast steel.	Pressed or cast steel.
Brakes	Westinghouse.	Westinghouse.
Brake beams	Davis.	Davis.
Brake shoes	Pittsburgh.	Pittsburgh.
Brasses	M. C. B. standard.	M. C. B. standard.
Couplers	Pitt for 400, Latrobe or Climax for 450.	Major.
Doors	Drop ends.	Drop.
Door fastenings		Symington or Lind.
Draft gear	Westinghouse.	Westinghouse.
Dust guards	Wood.	Wood.
Journal boxes	Buckeye or Kensington.	Buckeye or Kensington.
Paint	P. R. R. standard.	P. R. R. standard.
Springs	Helical.	Helical.
Trucks	Diamond.	Diamond.
Wheels	Cast steel.	Steel (Carnegie, Midvale and Standard, each 100 cars).

IRON AND STEEL.

THE CLEVELAND SHORT LINE has ordered 3,200 tons of rails from the Illinois Steel Company.

THE KANSAS CITY, MEXICO & ORIENT has ordered 2,000 tons of rails from the United States Steel Corporation.

THE AKRON, CANTON & YOUNGSTOWN has ordered 550 tons of structural steel from the American Bridge Company.

THE BUFFALO, ROCHESTER & PITTSBURG has ordered 300 tons of bridge steel from the Lackawanna Bridge Company.

THE OREGON ELECTRIC, Portland, Ore., has ordered 284 tons of structural steel from the American Bridge Company, for the bridge over Rock Creek, Ore.

THE NEW YORK, NEW HAVEN & HARTFORD AND THE PENNSYLVANIA have awarded the contract for the steel for the Hell Gate bridge to the American Bridge Company.

GENERAL CONDITIONS IN STEEL.—Conditions in the steel industry show but little change. Prices are still at the same low level and orders are decreasing. It is anticipated that the production in October will show a shrinkage of from 5 to 10 per cent. compared with September production. During the last few days the railways have entered the equipment market more freely than of late, but orders for rails and structural steel are almost nil.

FOREIGN RAILWAY NOTES.

The railway from Ilo, on the coast of Peru, to Moquegua, 63 miles, has been leased by the government of Peru to the Peruvian Corporation for 20 years, with an option for 10 years more, to be operated in connection with the southern railways of this company.

It has been found on the Rhodensian railways, South Africa, that no wooden tie is absolutely secure from white ants; even creosoted ties succumb as soon as they lose their objectionable flavor. Local hard wood, karri and jarrah, have failed. Steel ties used since 1892, on the other hand, are apparently little the worse for wear.

Supply Trade News.

Walter R. Burrows has resigned his position of manager of the railway department of Topping Brothers, New York, and will make and sell Burrows jacks on his own account, with office at 150 Chambers street, New York. .

The Montreal Locomotive Works, Montreal, Que., has received an order from the Canadian Northern for one rotary snow plow with tender. The dimensions of the cylinders will be 17 in. x 22 in., and the scoop wheel will have a 10 ft. 7 in. cut.

H. P. Walden, purchasing agent in the manufacturing department of the Pullman Company, Chicago, has been transferred to Pullman, Ill., W. T. Stewart, purchasing agent of the operating department, will remain in Chicago.

The Scullin-Gallagher Iron & Steel Company, St. Louis, Mo., has recently purchased three cranes with capacities of 30 tons, 10 tons and 5 tons, from the Alliance Machine Company, Alliance, Ohio, and two cranes of 25- and 10-ton capacities from the Niles-Bement-Pond Company, New York. This equipment, together with the six new mold drying ovens, new core room and five ovens, and the extensions to the main foundry, annex and chipping shops of its No. 2 plant, will more than double the company's capacity for making miscellaneous steel castings. The No. 1 plant, the capacity of which was doubled less than a year ago, will continue to be devoted entirely to the production of steel castings for railway purposes.

J. F. Deems, general superintendent of motive power, rolling stock and machinery of the New York Central Lines, has resigned to become president of the Ward Equipment Company, New York, with office in that city. Mr. Deems was born at Brownsville, Pa., in 1856. After graduating from the South Western Institute of Pennsylvania he entered railway service as an apprentice on the Baltimore & Ohio. He left the Baltimore & Ohio to go to the Chicago, Burlington & Quincy as machinist in the shops at Beardstown, Ill., and after eight months he was made gang foreman and then roundhouse foreman. He was roundhouse foreman at Galesburg, Ill., and then returned to Beardstown as general foreman. He was next made master mechanic at Ottumwa, Iowa, but soon returned, in the same capacity to Beardstown, where he remained until he was made master mechanic at West Burlington, Iowa. It was in this capacity that he did his most important work on this road by establishing piece work on a new basis, which spread over the entire system. From April 1, 1900, to June 1, 1901, he was assistant superintendent of motive power at Burlington, and from June 1, 1901, to March 1, 1902, he was superintendent of motive power at Chicago. On March 1, 1902, he resigned his position with the Chicago, Burlington & Quincy to become general superintendent of the Schenectady, N. Y., plant of the American Locomotive Company, New York. In December, 1902, he was made general superintendent of motive power, rolling stock and machinery of the New York Central Lines, with office in New York, a newly created position. Mr. Deems is a past-president of the American Railway Master Mechanics' Association, and the keynote of his presidential address, before that association in 1907, was the necessity for the proper training and development of the men. He was the first to introduce modern apprenticeship. He was one of the five members of the committee representing the rail-

J. F. Deems.

ways in the safety appliance conferences at Washington. He has been president of the Western Railroad Club; president of the New York Railroad Club; and a delegate to the International Railway Congress.

The Ward Equipment Company, which is about three years old, makes car heating and ventilating systems. This company recently bought control of the Economy Car Heating Company, owners of the steam heating device described in the *Railway Age Gazette* of October 20, p. 776. During the past year the Ward company opened branch offices in Atlanta, Ga., Boston, Mass., and Chicago.

TRADE PUBLICATIONS.

Wire Tapes.—The Keuffel & Esser Company, Hoboken, N. J., has published, in a small circular, a price list of its flat wire tapes and band chains.

Lock Nuts.—The Columbia Nut & Bolt Company, Bridgeport, Conn., has published a small illustrated booklet describing its nut locks and showing why they lock.

Rock Drills.—The Chicago Pneumatic Tool Company, Chicago, has published an 88-page, illustrated catalog, describing in detail its rock drills, air compressors and pile drivers, with the prices of each and line drawings of the special parts.

Pipe Threading Dies.—The National Tube Company, Pittsburgh, Pa., has published Bulletin No. 6 on pipe threading dies. The bulletin is illustrated and gives an interesting discussion of the prime requisites of a die which will thread both wrought iron and steel pipe with equally good results.

Buckets.—The Hayward Company, New York, manufacturers of buckets and digging machinery, has issued pamphlet No. 576, describing in detail the new Hayward drag scraper bucket. The booklet shows several photographs of these buckets in operation and gives an illustration and a short description of each part of the bucket.

Coal Washing Plants.—The Roberts & Schaefer Company, Chicago, has published a 42-page booklet entitled Modern Coal Washing Plants, in which it illustrates and briefly describes a number of complete coal washing plants which have been installed throughout the country. Each plant is different from the others, for the company treats each coal washing proposition individually.

Universal Portland Cement.—The Universal Portland Cement Company, Chicago, has published an interesting booklet entitled The Manufacture of Universal Portland Cement, in which information is given regarding the output, the raw materials used, the operations, the sampling, etc., at the various plants. A graphic diagram is included, showing the various steps in the manufacturing operations.

Curtis Steam Turbines.—The General Electric Company, Schenectady, N. Y., has issued bulletin No. 4845, containing detailed descriptions and illustrations of its horizontal steam turbine generators of from 100 to 1,000 k. w. capacity at 3,600 r. p. m., which is the maximum speed with 60-cycle, alternating-current generators. These units are designed particularly for industrial and lighting plants requiring the economical generation of a moderate amount of power.

Southern Railway.—The Land and Industrial Department of the Southern Railway has issued the 1911 textile directory, which gives a list of the cotton, knitting and woolen mills on the lines of the Southern Railway and the Mobile & Ohio. The post office address, name of company, number of mills, number of looms and spindles, and the type of power used, as well as the character of the goods manufactured, are given. The 1911 directory shows that there are 778 textile mills, having 8,550,142 spindles and 192,882 looms, situated on the lines of the Southern Railway and the Mobile & Ohio. The Land and Industrial Department of the Southern has spent, and is spending, a great deal of time and care in the preparation of very full information in regard to the advantages of milling sites in its territory, and the textile directory is only one of a number of publications dealing with this subject; and, of course, in addition the department has a great deal of information which it furnishes free to those interested.

Railway Construction.

New Incorporations, Surveys, Etc.

Arizona Construction & Finance Company.—Incorporated in Arizona with $2,000,000 capital, and headquarters at Phoenix, to construct an electric railway system; R. A. Lewis, W. B. Barr and S. D. Dunlap, are directors.

Atchison, Topeka & Santa Fe.—According to press reports this company has under consideration plans for building a 180-mile line from El Paso, Tex., east to Pecos, on the Pecos River Railroad, and it is understood that the line may eventually be continued further east to the Sterling City branch, at Sterling City, an additional 160 miles.

Baltimore & Ohio.—The report of this company for the year ended June 30, 1911, shows that satisfactory progress has been made on the extensive betterment work, referred to in the last report. The more important improvements completed during the year include the following: Change of line and grade reduction Concord, Pa., to Wilmington, Del., on the Philadelphia division. Third track on the Cumberland division between Cherry Run, W. Va., and Orleans Road; Bond and Swanton, Md., Deer Park and Moutain Lake Park; Terra Alta, W. Va., and Rodemer, also between West End and Hardman, a total of 44.7 miles. In connection with this work the tunnels at Everett, McGuires, Rodemer and Murray, were converted into open cuts. A change of grade and alinement between Hutton, Md., and Cornith, W. Va., or 24 miles was also finished, and the third track was completed between Foley and Manila, 6.1 miles on the Connellsville division. The Quemahoning branch was extended nine miles to a connection with the Somerset & Cambria branch at Somerset, Pa. Second track was completed from Wellsboro, Ind., to McCool, 21 miles on the Chicago division, including an interlocking plant at Babcock. The larger improvements now under way include the following: Second track construction on the Chicago division between Hamler, Ohio, and Holgate; Delaware Bend and Mark Centre, and Lapaz Junction, Ind., and Wellsboro, 35.5 miles. Grading is under way for second track between Holgate, Ohio, and Midway, also between Cromwell and Milford Junction, a total of 22 miles. Third track construction from Weverton, Md., to Sandy Hook; Green Spring, W. Va., to Patterson Creek; Manila to N. A. Tower and Garrett, Pa., to Rockwood, is now under way. Passing tracks and sidings are being put in at various points on the line between Parkersburg, W. Va., and East St. Louis, Ill. Work on the change of line and reduction of grade between Blaser and the west end of Kingwood Tunnel, about 4 miles, including the construction of a double track tunnel, 4,250 ft. long, has progressed steadily during the year, and is about one-half done. The present single track line from Kingwood Tunnel, operated in conjunction with this new line, will provide three tracks and afford necessary relief, where the movement of traffic has hitherto been much restricted. The construction of 1.8 mile of new line, including a double track tunnel 4,000-ft. long through the Allegheny mountains, between Sand Patch, Pa., and Manila, is under way, it is expected that this work will be finished by January, 1913. A new westbound freight classification yard is being constructed at Brunswick, Md., and additional interchange facilities with the Cumberland Valley Railroad are being constructed at Cumbo, W. Va.; work is also under way on additional terminal yards and facilities at Somerset, Pa. The new east and westbound yards at Chicago Junction, Ohio, have been put in operation.

Bartlett Western.—According to press reports work is now under way on an extension from Jarrell, Tex., west to Florence, 12 miles, and as soon as this work is finished, construction is to be started on an eastern extension from Bartlett, about 150 miles, to a connection with the Trinity-Colmesneil line of the Missouri, Kansas & Texas. It is understood that a line is also to be built north from Florence, to a connection with the Santa Fe. C. J. Grainger, vice-president and general manager, Bartlett.

Butte, Boise & San Francisco.—This company, which was incorporated at Helena, Mont., will soon start construction work, it is said, from Butte, Mont., southwest through Montana and Idaho. Dr. W. H. Haviland, Butte, Mont., is interested. (September 15, p. 543.)

CALIFORNIA ROADS.—A preliminary survey is now being made for a line from Dumont, Cal., on the Tonopah & Tidewater, to the mines of the Avawatz Gypsum Company, 12 miles. Construction work will not be started until next year. T. L. Henderson is secretary and field manager of the Avawatz Gypsum Company, Hellman building, Los Angeles, Cal.

CALIFORNIA ROADS (Electric).—It is understood that an electric line is to be built from a connection with the Western Pacific, near Virgilia, Cal., to Nevis, about 27 miles. The Great Western Power Company and T. B. Walker are said to be interested.

Plans are now being made by H. R. O'Bryan, it is said, to build from Del Monte Heights, Pacific Grove, Cal., to the Hot Springs.

A line is projected from Fresno, Cal., via. the Bullard district, to San Joaquin river. J. C. Forkner, Fresno, is interested.

CANADIAN NORTHERN.—Bids will be asked for soon, it is said, to build an extension from mile 60 to mile 100 at Cowichan Lake, Vancouver Island.

Premier Roblin has announced that a direct railway from Winnipeg, Man., to Hudson Bay, along the east shore of Lake Winnipeg, will be built soon by the Canadian Northern and the government of Manitoba will give the necessary support to insure construction.

This company is asking for an extension of time to complete the following lines: Quebec, Que., to Moncton, N. B.; St. Jerome, Que., to the Gatineau branch of the Canadian Pacific Railway, and from the international boundary to Montreal; Toronto, Ont., to Ottawa; French River, to Ottawa; Sudbury to Port Arthur, and several branches in Northern Ontario. In western Canada the company will ask for an extension of time to build a number of lines already authorized.

Under the name of the Canadian Northern & Tunnel Terminal Co., application will be made for authority to construct a railway tunnel under Mt. Royal, at Montreal, Que. The estimated cost of the work is $25,000,000. It is understood that the Canadian Northern will spend a large sum of money on improvement work around Montreal, including lines connecting its tracks with the Canadian Northern Ontario, and the Canadian Northern Quebec railways, as well as those of the Harvard Commissioners of Montreal. The tunnel will be about three miles long.

CANADIAN ROADS.—A charter has, it is said, recently been granted to D. J. McArthur, of Winnipeg, Man., and associates, to build from Edmonton, Alberta, to Fort George, B. C. The line is to enter British Columbia via Pine River Pass, north of Yellowhead Pass, and will be about 1,000 miles long. It is expected that the work will be finished and the line open for operation within four years. Financial arrangements have been made.

CHICAGO, MILWAUKEE & PUGET SOUND.—According to press reports a contract has been given to Cochran, Boynton & Co., at $100,000, for grading three miles from Atlas, Idaho, to Coeur d' Alene. This is the last contract for grading on the line from Spokane, Wash., to Coeur d'Alene, Idaho, a previous contract having been let to A. C. Henry, for work as far as Atlas. It is expected that the work will be finished by December 15. S. P. Sawyer will be in charge of the grading.

CHICAGO, ROCK ISLAND & PACIFIC.—The report of this company for the year ended June 30, 1911, shows that new lines were constructed during the year, including a single track connection, 1.46 mile long, between a point 6.55 miles west of Forsyth Junction, Mo., on the line leading from St. Louis to Kansas City and a point on the St. Louis Belt & Terminal Railway. near Olivette. This enables the R. I. to reach its terminal yards in North St. Louis, which have been completed during the current fiscal year, by a shorter route than if the traffic were handled through Forsyth Junction. This line was put in operation December 17, 1910. It is laid with re-rolled 80-pound rail on creosoted ties, and ballasted with gravel. Work is now under way on a line between Carlisle, Ia., and Allerton, 67 miles. The line will pass through valuable coal fields. Industrial side tracks have been constructed during the year to six coal mines and to 64 private industries, a total of 70 additional tracks. Extensions were made to one mine track and 31 tracks to other industries, making a total of 32 tracks extended during the year. A large sum of money was spent during the year for the construction of additions to terminals, and improved terminal facilities. J. B. Berry, chief engineer, Chicago, Ill.

CLEVELAND & YOUNGSTOWN.—An ordinance has been introduced at the meeting of the city council of Cleveland to grant this company a right-of-way to enter that city with a four-track tunnel to a new terminal station, to be built at Ontario street and Prospect avenue. The company was organized several months ago to build and operate a steam or electric line in the state of Ohio, and it was understood that it would form the connecting link between Cleveland and Youngstown as an extension of the Youngstown lines of the Public Railway and Light Company, which has recently secured control of the Mahoning valley lines. The new company has secured a right-of-way through Cuyahoga, Geauga, Portage, Trumbull and Mahoning counties. J. P. Wilson, president, J. T. Harrington, vice-president and Judge N. C. Deford, treasurer.

CUYUNA NORTHERN.—An officer writes that contract has been let to Guthrie Bros., Deerwood, Minn., to build a short section from Deerwood, Minn., to the mine at section 30-46-28. The line is being built to carry iron ore. C. Adams, president, Deerwood.

DENVER, NORTHWESTERN & PACIFIC.—According to press reports, financial arrangements have recently been completed which insures the building of the extension from the present western terminus at Steamboat Spring, Colo., west towards Salt Lake City, Utah. L. D. Blauvelt, chief engineer, Denver, Colo.

EUGENE BELT LINE AND INTERURBAN.—Incorporated in Orgeon, with $250,000, to build a line to connect Eugene, with Springfield, Coburg and Junction City. The company proposes to put up shops at south Eugene. P. C. Lavey, J. H. Tingle and C. H. Lavey, Portland, are the incorporators.

FLATHEAD INTERURBAN.—Surveys are now being made, it is said, to build a line near Kalispell, Mont. A. L. Jaqueth is the engineer in charge of the work.

GAINESVILLE & ROBERTSTOWN.—According to press reports financial arrangements have been made to build from Gainesville, Ga., north via. Concord and Cleveland, into the Blue range. President McCombs, of the Bryd-Matthews Investment Co., St. Louis, Mo., is back of the project.

GREAT NORTHERN.—An officer writes that a contract has been given to Caughren & Woldson, Spokane, Wash., to build from Bluestem, Wash., to the Columbia river, about 39 miles. A. H. Hogeland, chief engineer, St. Paul, Minn. (July 14, p. 105.)

MARSHFIELD-ALBION.—Incorporated at Albion, Idaho, with $100,000 capital, to build a nine-mile line from Albion. T. E. Harper, C. O. Dumas and W. Powell are interested.

MISSISSIPPI ROADS.—J. F. Johnson is back of a project to build a logging line up the valley of the Pearl river in Mississippi, and it is expected that work will be started on the line before the close of 1911. Northern capitalists, who own large tracts of land in that section, are also interested in the project.

MONTANA ROADS (Electric).—An electric line is to be built it is said, between Whitefish, Mont., and Kalispell. D. R. McGinnis, Flathead, is interested.

NEW YORK SUBWAYS.—The New York Public Service Commission, First district, has awarded the contract to the Bradley Contracting Co., New York City, for work on section 13 of the Lexington avenue subway, from 118th to 129th street. This company's bid was $4,071,416, and with the four other sections previously let to this company, it has now under contract $47,460,382 worth of subway work. The other bidders for section 13 were the Hugh Nawn Contracting Company, $4,269,594; Brody & Adler, $4,628,702, and the MacArthur Brothers Company, $4,892,484. . (October 13, p. 735.)

OAKLAND TRACTION.—It is said that a line is to be built soon from Berkeley, Cal., to the northern boundary of Alameda county. Application for a franchise has been made. F. W. Nelson, chief engineer, Oakland, Cal.

OREGON & SOUTHERN.—Organized in Oregon to build from Medford, through the Rogue river valley, to a point in California. J. A. Voyle, Spokane, Wash., is said to be interested.

OREGON ROADS (Electric).—Announcement has been made that a preliminary survey has been finished for an electric line between

Canby, Ore., and Portland, 14 miles. There is also to be a branch to Oregon City, 3 miles long. This work includes piercing a tunnel under Council Crest, with a subway extension into the heart of the city. It is understood that the line will cost $5,000,000. M. J. Lee, associated with Pennsylvania capitalists, is back of the project.

Oregon Trunk.—According to press reports a contract has been given to the Henry Construction Company for building an extension on a section of 30 miles from Bend Ore., south towards Klamath Falls. It is expected that additional contracts will be let soon. The line was recently completed from the Columbia river south to Bend. R. Budd, chief engineer, Portland. (October 6, p. 691.)

Oregon-Washington Railroad & Navigation Company.—According to press reports this company recently incorporated at Olympia, Wash., a $1,000,000 subsidiary, to build the North Coast extension from North Yakima to Point Mole, south of Auburn, connecting with the Harriman line between Tacoma and Seattle, the connecting point being 13 miles from Tacoma and 23 miles from Seattle. The projected line will be 117 miles long, paralleling the Northern Pacific's main line across the Cascades at an average distance of 30 miles to the south.

Portland & West Coast Railroad & Navigation Company.—Application has been made for permission to build between Pacific City, Ore., and Tillamook. The incorporators include W. F. Prier, C. M. Hendrickson and J. H. Upton. (August 18, p. 357.)

Royal Canadian Railway.—An application will be made to the Canadian Parliament for permission to build from Ste Anne de Bout de l'Isle, Jacques Cartier, Que., through the counties of Vaudreuil and Soulanges, to a point on the St. Lawrence river, in Glengarry county, with power to construct two bridges over the Ottawa river at Ile Perrot. The names of the promoters are not given.

Sacramento Woodland (Electric).—A contract has been given to the Dozier Construction & Engineering Company to build from Woodland, Cal., to Sacramento. T. T. C. Gregory, Suisun, and G. A. Posey, San Francisco, are incorporators. (August 4, p. 269.)

Salt River Valley (Electric).—This company, which was recently incorporated, has applied for a franchise at Phoenix, Ariz. The plans call for building from Phoenix to Scottsdale, also from Phoenix via Tempe, and Mesa to Chandler, and from Phoenix, via Glendale, to Peoria. F. M. Winter, president, Phoenix, Ariz. (August 25, p. 391.)

San Jose & Almaden (Electric).—Incorporated at San Jose, Cal., with $120,000 capital, to build from San Jose to Almaden, about 12 miles. C. A. Nones, D. M. Burnett and C. P. Anderson are incorporators.

Santa Fe, Prescott & Phoenix.—A contract has been given to the C. D. Smith Construction Company, Memphis, Tenn., for grading from Cedar Glade, Ariz., to Jerome, about 38 miles. J. A. Jaeger, chief engineer, Prescott. (October 27, p. 860.)

Southern Pacific of Mexico.—This company will soon make application to the Mexican government for a concession, it is said, to build an extension from Tepic to a connection with the Pan-American and the National Tehuantepec railways, about 900 miles. The proposed route is down the Pacific coast, in some places hugging close to the ocean in order to obtain a passageway. It is stated that the Southern Pacific has received assurances that a liberal subsidy will be granted by the government in aid of the proposed extension. Much heavy construction work will be encountered, as the mountains jut down close to the sea in many places, particularly in the State of Guerrero. Many rivers must be crossed, among the larger being the Cohahuayana, Balsas, Ometepec and Verde. The grading force upon the division between the Santiago river and Tepic has been increased, and it is expected that trains will be running into the latter city soon. When the line is finished to Tepic, construction work will be concentrated on the division between that city and Orendain, near Guadalajara. The latter division lies through the Sierra Madras, and is made up chiefly of a series of tunnels and bridges. Several months ago the Southern Pacific was granted a concession by the government to extend its line from Orendain to the City of Mexico, via Guadalajara, and it is stated that this construction work will be started as soon as the surveys are finished and formally approved by the federal authorities. L. H. Long, assistant general manager, Tucson, Ariz. (July 28, p. 199.)

Springfield & Western.—An officer writes that the company has secured a franchise from the city council of Springfield, Mo., to enter that city from the west on Division street. The permanent location is now being made on the line from Springfield west towards Joplin. M. M. Hollenbeck, chief engineer, Springfield. (November 25, 1910, p. 1023.)

Taloga, Putnam & Southern.—An officer writes that contracts will be let December 1 to build from Woodward, Okla., southeast to Chackasha, about 135 miles. S. H. Whittenberg, president, and C. W. Musgrove, general manager, Taloga.

Texas Roads (Electric).—A company is being organized to build an interurban line from Clarksville, Tex., southwest via Paris, Greenville and Rockwall to Dallas, about 140 miles. It is understood that the right-of-way is being secured. Major Joseph F. Nichols is the principal promotor, Greenville, Tex.

Tidewater & Southern.—This company is now building from Stockton, Cal., to Turlock. J. H. Wallace, president, Stockton. (October 13, p. 735.)

Washington Roads.—A line is to be built, it is said, from Vancouver, Wash., to a point near Klickitat Pass, about 100 miles. E. R. Ernsberger, of the Mount Hood Railway & Power Company, Los Angeles, Cal., is said to be interested.

RAILWAY STRUCTURES.

Arverne, N. Y.—The Long Island Railroad is shifting the tracks at Arverne, preparatory to beginning work on a new station, to be built at Vernon avenue.

Chattanooga, Tenn.—The Nashville, Chattanooga & St. Louis has let the contract for remodeling and enlarging its freight house and office quarters at Chattanooga.

Colfax, Wash.—The Spokane & Inland Empire has taken out a permit to build a new station at Colfax. (August 4, p. 269.)

Delrio, Tenn.—It is understood that the Southern Railway will soon build a station at Delrio, to replace the structure which was destroyed by fire some time ago. The company has recently opened a new station at Morristown.

Eugene, Ore.—See Eugene Belt Line & Interurban, under Railway Construction.

Grafton, W. Va.—The report of the Baltimore & Ohio, for the year ended June 30, 1911, shows that additional terminal facilities at Grafton, W. Va., referred to in the last annual report were about finished at the close of the fiscal year, and, together with the new passenger station, have since been put in service. Three improved ore handling machines were put in service at Lorain, Ohio, and new or enlarged station facilities were completed at Wilmington, Del.; Lorely, Md.; Harrisonburg, Va., Fort Defiance, Parkersburg, W. Va., Huntington, Philippi, Millers, Elm Grove, Oakley, Ohio, Portsmouth, Napanee, Ind., Garrett and at Noble, Ill. A large bascule drawbridge over the Cuyahoga river at Cleveland, Ohio, has been completed. Considerable progress has been made during the year in renewing bridges for the use of heavier power. The more important bridges renewed were: Schuylkill river drawbridge at Philadelphia, Pa., Brandywine viaduct at Wilmington, Del., and at the Cheat river at Rowlesburg, W. Va. The elimination of grade crossings in the cities of Baltimore, Md., Columbus, Ohio, and Chicago, has progressed steadily during the year. It is expected that this work at Columbus, Ohio, will be completed early in the current year, and that the work at Baltimore, Md., and Chicago will extend over a period of years.

Jamieson, Ore.—The Oregon Short Line will build a new station, it is said, at Jamieson.

Jasper, Ore.—See Natron.

Los Angeles, Cal.—The Pacific Electric has bought 100 acres

of land in Dominguez, it is said, and is planning to put up new shops on the site.

LOWELL, ORE.—See Natron.

LYONS, ORE.—The Corvallis & Eastern will start work at once, it is said, on a new station at Lyons.

MINOT, N. DAK.—The Minneapolis, St. Paul & Sault Ste. Marie is contemplating building a brick passenger station.

MORRISTOWN, TENN.—See Delrio.

NATRON, ORE.—The Southern Pacific has given a contract to W. L. Graff, San Francisco, Cal., to put up new stations at Natron, Ore., at Lowell and at Jasper.

NEW YORK.—The New York, New Haven & Hartford and the Pennsylvania Railroad companies have awarded the contract for the steel work for the Hell Gate bridge and approach viaducts on the New York Connecting Railroad to the American Bridge Company.

OAKMONT, PA.—According to press reports a contract has been given by the Pennsylvania Railroad, for building a new concrete and steel bridge over the hollow near Craigdell station, above Oakmont, on the Conemaugh division, to cost about $40,000.

OTTAWA, ONT.—According to press reports, plans have been submitted to the city authorities of Ottawa for a union passenger station to be built between Canal street and Rideau Canal, opposite the Grand Trunk station, now nearing completion. It is understood that the Canadian Pacific and the Canadian Northern will jointly carry out the work.

PASCO, WASH.—The Northern Pacific has let the contract to Deeks, Deeks & Smith, St. Paul, for building a 37-stall brick and concrete roundhouse, a machine shop, car shop, power house, coal dock and repair shop. The cost of the entire group of buildings will be approximately $250,000. (July 14, p. 106.)

POWER, MONT.—The Great Northern will probably build a new station at Power.

RIVERBANK, CAL.—The Atchison, Topeka & Santa Fe Coast Lines will build a 15-stall roundhouse at Riverbank, to cost approximately $50,000.

SAGINAW, MICH.—The Pere Marquette has let the contract for building a woodworking shop 80 ft. x 150 ft.

SEATTLE, WASH.—The Northern Pacific has received bids for reconstructing pier No. 1 at Seattle, and it is understood that the contracts will be let soon. The improvements will cost about $60,000. (October 6, p. 692.)

SIDNEY, NEB.—The Union Pacific roundhouse at Sidney was recently destroyed by fire, with an estimated loss of $25,000.

STURGIS, KY.—The Illinois Central is contemplating building a new passenger station.

WAURIKA, OKLA.—The Chicago, Rock Island & Pacific is preparing plans for a new passenger station.

On June 30, 1911, there were 293 miles of railways under construction in New South Wales, of which 190 miles consist of a section of the North Coast line. The railways authorized but not commenced represented an additional 243 miles, of which 120 miles were sections of the North Coast line. Apart from the North Coast, therefore, there is really comparatively little new construction under way. On August 14 the first section of the North Coast line was opened for traffic from Maitland to Dungog, about 32 miles. The work on the railway is very heavy and involves the construction of two large bridges over the Paterson and Hunter rivers; also the building of a tunnel 330 yds. long. The railway is a first-class single track line, with full ballast and 80-lb. rails. The ruling grade is 1.25 per cent. and the sharpest curve has a radius of 154 yds. In addition to this portion, four other sections are under construction as follows: Dungog to Gloucester, Gloucester to Taree, Taree to Wanchope, and Grafton to Glenreagh. In addition, the Coff's Harbor to Glenreagh and the Coff's Harbor to Bellinger sections are to be commenced, in order to provide an outlet for the Bellinger trade. The Dungog-Gloucester section includes a long tunnel which will delay completion for a long time, but the Gloucester-Taree section is nearly finished.

Railway Financial News.

ATCHISON, TOPEKA & SANTA FE.—Stockholders have voted to approve the issue of $100,000,000 common stock to provide for the conversion of $100,000,000 convertible bonds, the issue of which was also approved. Stockholders have also voted to make available for improvements $10,800,000 preferred stock, deposited by the reorganization committee in 1896. The stockholders also approved the purchase of a line from Needles, Cal., to Mojave. This line is now owned by the Southern Pacific and operated under lease by the Santa Fe.

DELAWARE & NORTHERN.—The New York Public Service Commission, Second district (state), has authorized this company, which is the successor of the Delaware & Eastern, to issue $1,000,000 common stock and $250,000 preferred stock, the common and half the preferred to be used to acquire from the reorganization committee of the bondholders of the Delaware & Eastern the property which was sold under foreclosure; $125,000 of preferred stock is to be used to pay for equipment and improvements.

ERIE.—The New York Public Service Commission, Second district (state), has authorized the Erie to issue $4,600,000 equipment trust certificates.

HOCKING VALLEY.—The *Ohio State Journal* says that the Ohio railway commission is to approve the issue of $4,000,000 2-year 4½ per cent. notes, of which $3,250,000 will be used to retire maturing obligations and $750,000 for additions and betterments.

LOUISIANA & NORTHEASTERN.—Stockholders have authorized the issue of $1,860,000 collateral trust notes, the money from the sale of these notes to be used for the extension of the line to Prescott, Ark.

MISSOURI PACIFIC.—Speyer & Co., New York, have bought and resold about $5,300,000 equipment trust notes, about half of them issued by the Missouri Pacific and the other half by the St. Louis, Iron Mountain & Southern. The notes are to be secured by equipment costing $6,300,000, toward which the railway companies have paid 10 per cent. in cash. The notes are due in 20 semi-annual instalments. The equipment consists of 65 locomotives; 50 passenger, baggage and mail cars; 5,400 freight cars, and a gasolene motor car.

NATIONAL RAILWAYS OF MEXICO.—The earnings of this company, not being reported to the Interstate Commerce Commission, are not published in our regular table of earnings and expenses of railways. In September, 1911, the National Railways, operating 6,132 miles, had gross earnings of $5,287,218, as compared with $5,124,243 gross in September, 1910. Operating expenses amounted to $2,923,440 in 1911, and to $3,098,887 in 1910. This left net earnings of $2,363,778 in September, 1911, an increase of $338,442 over September, 1910.

NEW ORLEANS, MOBILE & CHICAGO.—Alonzo Potter and Elisha Walker, both of William Salomon & Co., New York, have been elected directors of the New Orleans, Mobile & Chicago, control of which, as has been previously announced, has been bought by B. F. Yoakum, of the St. Louis & San Francisco. It is understood that William Salomon & Co. have bought $12,046,500 first and refunding mortgage 5 per cent. bonds of the N. O., M. & C.

NORFOLK & WESTERN.—This company has declared a quarterly dividend of 1½ per cent. on the common stock, payable December 18. This is an increase of one-quarter of 1 per cent. semi-annually and puts the stock on a 6 per cent. annual basis, as compared to a 5 per cent. paid annually since October, 1909. This will increase the requirements for dividends by about $750,000 on the stock at present outstanding, and with the full conversion of convertible bonds now outstanding, there will be about $91,569,000 common stock calling for the payment of $5,494,140 dividends at the 6 per cent. rate.

RALEIGH & CHARLESTON.—A press despatch dated Marion, S. C., says that the Seaboard Air Line has bought control of the Raleigh & Charleston, which runs from Lumberton, N. C., to Marion, 41 miles.

SEABOARD AIR LINE.—See Raleigh & Charleston.

ANNUAL REPORTS

THIRTY-FIRST ANNUAL REPORT OF THE CHICAGO, ROCK ISLAND AND PACIFIC RAILWAY COMPANY.

To the Stockholders:

The Board of Directors herewith submit their report of the operations and affairs of the Rock Island Lines for the fiscal year ended June 30, 1911.

The results of the operations for the year were as follows:

Total operating revenue (increase $2,266,894.10, or 3.4 per cent.)	$68,487,473.04
Operating expenses (increase $986,314.09, or 2.1 per cent.)	49,055,683.00
Net operating revenue (increase $1,280,580.01, or 7.1 per cent.	$19,431,790.04
Taxes (decrease $168,049.71, or 5.8 per cent.)	2,708,650.96
Operating income	$16,723,139.08
Miscellaneous income	185,477.06
Total income	$16,908,616.14
Interest and rentals	11,465,902.48
Balance of income, after providing for all charges, being 7.2 per cent. on capital stock ($75,000,000.00)	$5,442,713.66
Dividends paid (5¼ per cent. on capital stock)	3,930,948.00
Balance surplus for the year (increase $507,156.58, or 50.5 per cent.)	$1,511,765.66

CAPITAL STOCK.

The capital stock of the company outstanding at the close of the previous fiscal year was $74,877,200.00, remaining the same at June 30, 1911.

FUNDED DEBT.

During the year the funded debt, not including equipment notes, increased $3,810,000.00 and equipment notes decreased $1,650,000.00, making a net increase in total funded debt of $2,160,000.00. Details will be found on pages 17 and 20.

ROAD AND EQUIPMENT.

The cost of the "Investment since June 30, 1907" increased $2,456,437.79 during the past year, which figure includes the value of new equipment purchased under trust agreement or otherwise acquired, and exependitures for additions and betterments. For particulars, see pages 18 and 19.

NEW LINES CONSTRUCTED.

A single track connection, 1.46 miles long, has been constructed between a point 6.55 miles west of Forsyth Junction, Missouri, on the line leading from St. Louis to Kansas City and a point on the St. Louis Belt & Terminal Railway near Olivette, Missouri. This enables your company to reach its terminal yards in North St. Louis, Missouri, which have been completed during the current fiscal year, by a shorter route than if the traffic were handled through Forsyth Junction, Missouri. This line was completed December 10, 1910, and put into operation December 17, 1910. It is laid with re-rolled eighty-pound steel rail on creosoted ties and ballasted with gravel.

NEW EQUIPMENT.

Orders have been placed during the year for 41 steel passenger train cars, and there are also to be delivered on previous year's contracts 7 smoking cars, 6 combination passenger and baggage cars and 6 baggage and mail cars, all of steel construction, making a total of 60 steel passenger train cars to be delivered after June 30, 1911.

GENERAL.

Under date of February 18, 1911, a charter was granted, under the laws of the State of Iowa, to the St. Paul and Kansas City Short Line Railroad Company, with authorized capital stock of $45,000,000.00, of which $50,000.00 has been issued and is owned by your company.

The St. Paul and Kansas City Short Line Railroad Company also executed a first mortgage, covering an authorized issue of 4½ per cent. mortgage bonds of $30,000,000.00, maturing February 1, 1941, of which $10,000,000.00 were issued and acquired by your company. As consideration for the purchase of these mortgage bonds, your company agreed with the St. Paul and Kansas City Short Line Railroad Company, in substance as follows: (a) to acquire and turn over to the St. Paul and Kansas City Short Line Railroad Company the capital stock, mortgage bonds and all other indebtedness of the St. Paul and Des Moines Railroad Company, which owned and operated a railroad from Des Moines, Iowa, to Mason City, Iowa, a distance of 121 miles; (b) to furnish the funds (to an amount not exceeding $4,000,000.00) required to construct a line to Allerton, Iowa, a point on the main line of your company leading to Kansas City, from Carlisle, Iowa, a point on the Winterset branch line of your company, about eleven miles from Des Moines, Iowa; (c) to make a contract with the St. Paul and Kansas City Short Line Railroad Company, under the terms of which that company would operate the Winterset branch line.

Practically all of the capital stock, mortgage bonds and other indebtedness of the St. Paul and Des Moines Railroad Company have been acquired. The construction of the line from Allerton to Carlisle is in progress and will be completed about September 1, 1912.

The $10,000,000.00 of first mortgage bonds of the St. Paul and Kansas City Short Line Railroad Company acquired by your company as referred to above were guaranteed by endorsement as to both principal and interest and sold to provide the necessary funds with which to carry out your company's obligations.

Trains have been operated between Des Moines, Iowa, and St. Paul, Minn., over the rails of your company and those of the St. Paul and Des Moines Railroad via Mason City, Iowa, and Plymouth Junction, Iowa, the former company having negotiated the right to use the tracks of the Chicago, Milwaukee and St. Paul Railway Company between Mason City, Iowa and Plymouth Junction, Iowa, a distance of 8.0 miles.

When the construction of the line between Carlisle, Iowa and Allerton, Iowa, a distance of about sixty-seven miles, is completed, the St. Paul and Kansas City Short Line Railroad Company will operate a through line from Plymouth Junction, Iowa, to Allerton, Iowa, a distance of 202 miles of main line. Your company will then have over its own rails and those of the St. Paul and Kansas City Short Line Railroad the shortest route, by 43 miles, between St. Paul and Kansas City. The distance between those points via this route will be 489.3 miles. The line between Carlisle and Allerton will pass through valuable coal fields, now under process of development and will greatly strengthen the position of your company in competing for north and south bound traffic.

Under date of December 31, 1910, the Chicago, Rock Island and El Paso Railway Company executed an indenture by which it conveyed to The Chicago, Rock Island and Pacific Railway Company all of its railway and appurtenances thereunto belonging, which covered the line extending from the state line between Texas and New Mexico near Naravisa, New Mexico, to Santa Rosa, New Mexico, and from the state line between Texas and New Mexico near Glenrio, Texas, to Tucumcari, New Mexico. In consideration therefor, The Chicago, Rock Island and Pacific Railway Company assumed the outstanding funded debt of the grantor, aggregating $5,100,000.00.

The records of the industrial department show that there were located along the Rock Island Lines during the fiscal year one hundred and fifty new industries, estimated to have cost nearly twelve million dollars, to employ over sixty-five hundred men and to create an annual movement of forty-six thousand carloads of revenue freight.

Industrial side tracks have been constructed during the year to six coal mines and to sixty-four private industries, a total of seventy additional tracks. Extensions were made to one mine track and thirty-one tracks to other industries, making a total of thirty-two industrial tracks extended during the year.

During the year automatic block signals were installed and placed in operation from Eldon, Iowa, to Cameron Junction, Mo., from Linn Junction, Iowa, to Vinton, Iowa, from Neola, Iowa, to Council Bluffs, Iowa, and from Irving, Texas, to Fort Worth, Texas; 228.99 miles, making a total of 963.39 miles installed to June 30, 1911. The expenditure during the year for the construction of these signals was $204,023.76. The total expenditure to June 30, 1911, for the construction of block signals was $1,172,215.98.

Your company expended $996,247.06 during the year for construction of additional and improved terminal facilities. These figures cover new facilities and the completion of those previously reported.

In addition to the exependiture mentioned in the preceding paragraph, your company advanced for Houston, Texas, Terminals $78,072.89, making the total advances to June 30, 1911, $529,058.85. Interim certificates for the first mortgage bonds of the Houston Belt and Terminal Railway Company were received in settlement of $184,785.28; the balance due your company, amounting to $50,947.93, having been paid in cash.

For the first time in many years, the tax account shows a decrease. However such decrease, amounting to $168,049.71, or 5.84 per cent., is not due entirely to a decrease in the amount of taxes actually paid, but is due largely to over-accruals during the preceding year. Comparing the current fiscal year with the year ended June 30, 1908, the taxes increased $918,756.17, or 51.33 per cent., while the average miles operated increased less than one per cent.

Your company advanced $499,988.39 during the year, being one-half of the expenditures for additions and betterments, equipment and operating deficit of The Trinity and Brazos Valley Railway Company, making the total advances to June 30, 1911, $2,142,733.42.

Announcement of the pension system was made in last year's report and testimonials received indicate its favor with the employes. The total cost to your company for pensions paid, and the expense of administration during the year has been $35,662.26.

Owing to the supervision of your company's accounts by the Interstate Commerce Commission and to the fact that they are handled strictly in accordance with methods prescribed by that body, it is again considered unnecessary to have these accounts certified by an independent auditor.

By order of the Board of Directors,

H. U. MUDGE,
President.

October 20, 1911.

INCOME ACCOUNT.

YEAR ENDED JUNE 30, 1911, COMPARED WITH PREVIOUS YEAR.

	1910-11.	1909-10.	Increase or Decrease. Amount.	Per Cent.
Average mileage operated	8,026.09	8,043.59	—17.50	.22
Revenue from transportation:				
Freight	$43,368,395.66	$42,218,880.84	$1,149,514.82	2.64
Passenger	20,240,528.03	19,378,174.27	862,353.76	4.45
Mail	1,577,219.40	1,448,435.51	128,783.89	8.89
Express	2,053,549.44	1,927,245.61	126,303.83	6.55
Miscellaneous	800,107.57	774,380.24	25,727.33	3.32
Total transportation revenue	$68,039,800.10	$65,747,116.47	$2,292,683.63	3.46
Revenue from operations other than transportation	447,672.94	473,462.47	—25,789.53	5.45
Total operating revenue	$68,487,473.04	$66,220,578.94	$2,266,894.10	3.42
Operating expenses:				
Maintenance of way and structures	$9,738,015.96	$10,673,387.02	—$935,371.06	8.86
Maintenance of equipment	9,359,748.70	8,455,745.72	904,002.98	10.69
Traffic expenses	2,007,149.52	1,795,262.39	211,887.13	11.80
Transportation expenses	26,171,418.77	25,195,578.74	975,840.03	3.87
General expenses	1,779,350.05	1,949,395.04	—170,044.99	8.72
Total operating expenses	$49,055,683.00	$48,069,368.91	$986,314.09	2.05
Net operating revenue	$19,431,790.04	$18,151,210.03	$1,280,580.01	7.06
Taxes	2,708,650.96	2,876,700.67	—168,049.71	5.84
Operating income	$16,723,139.08	$15,274,509.36	$1,448,629.72	9.48

Outside operations (debit balance)	*$115,725.63*	*$155,891.29*	$40,165.66	25.77
Hire of equipment (debit balance)	*1,273,767.61*	*1,171,066.25*	—102,701.36	8.77
Other income	1,574,970.30	1,550,189.36	— 24,780.94	1.59
Total	$185,477.06	$223,231.82	—$37,754.76	16.91
Total income	$16,908,616.14	$15,497,741.18	$1,410,874.96	9.10
Interest	$9,741,852.72	$9,129,874.61	$611,978.11	6.70
Rentals	1,704,925.05	1,547,402.01	157,523.04	10.12
Betterments on leased lines	19,124.71	72,583.48	—53,458.77	73.65
Total charges	$11,465,902.48	$10,749,860.10	$716,042.38	6.66
Balance of income (available for dividends)	$5,442,713.66	$4,747,881.08	$694,832.58	14.63
Dividends	3,930,948.00	3,743,272.00	187,676.00	5.00
Balance surplus (carried to credit of profit and loss)	$1,511,765.66	$1,004,609.08	$507,156.58	50.48

DIVIDENDS DECLARED DURING YEAR ENDED JUNE 30, 1911:

Dividend No. 121, 1¼ per cent. paid October, 1910	$935,940.00
Dividend No. 122, 1 per cent. paid January, 1911	748,752.00
Dividend No. 123, 1½ per cent. paid April, 1911	1,123,128.00
Dividend No. 124, 1½ per cent. paid June, 1911	1,123,128.00
Total, 5¼ per cent.	$3,930,948.00

PROFIT AND LOSS.

Credit balance, June 30, 1910			$17,292,815.56
Surplus for year ended, June 30, 1911		$1,511,765.66	
Interest prior to current fiscal year on advances for construction		24,232.64	
Profit on purchase of scrip and warrants used in payment of taxes		3,729.65	
Sundry adjustments not affecting current year's income		56,874.74	
		$1,596,602.69	
Less:			
Loss on securities and lands sold.	$171,679.53		
Engineering expenses—special surveys made prior to current fiscal year — anticipated construction abandoned	89,701.24		
Unextinguished discount on securities	829,167.81		
	$1,090,548.58		
Depreciation on:			
Tracks removed	$69,286.18		
Structures sold, removed or destroyed	44,887.90		
Equipment sold, dismantled or destroyed	676,392.90		
	$790,566.98	1,881,115.56	$284,512.87
Credit balance, June 30, 1911			$17,008,302.69

CONDENSED GENERAL BALANCE SHEET.

JUNE 30, 1911, AND COMPARISON WITH PREVIOUS YEAR.

ASSETS.	1911.	1910.	Increase or Decrease.
Property investment:			
Road and equipment:			
Investment to June 30, 1907	$255,585,343.24	$255,585,343.24	.....
Investment since June 30, 1907	28,160,896.88	25,704,459.09	$2,456,437.79
Reserve for accrued depreciation—credit	*470,618.86*	*338,009.84*	—132,609.02
Total road and equipment	$283,275,621.26	$280,951,792.49	$2,323,828.77
Securities:			
Securities of proprietary, affiliated and controlled companies —pledged	99,504.00	3.00	99,501.00
Securities of proprietary, affiliated and controlled companies —unpledged	8,966,521.52	9,019,834.25	—53,312.73
Other investments:			
Advances to proprietary, affiliated and controlled companies for construction, equipment and betterments	7,041,287.21	5,511,717.39	1,529,569.82
Miscellaneous investments	2,258,858.07	1,739,696.55	519,161.52
Total property investment	$301,641,792.06	$297,223,043.68	$4,418,748.38
Working assets:			
Cash	$3,241,991.16	$4,541,460.59	—$1,299,469.43
Securities issued or assumed—held in treasury	4,758.23	4,227.50	530.73
Marketable securities	15,955,932.87	17,081,146.72	—1,125,213.85
Loans and bills receivable	456,522.76	596,515.44	—139,992.68
Traffic and car-service balances due from other companies	398,354.26	299,506.92	98,847.34
Net balance due from agents and conductors	1,041,406.29	1,142,880.35	—101,474.06
Miscellaneous accounts receivable	3,222,814.22	2,889,530.25	333,283.97
Materials and supplies	5,813,008.40	6,224,132.74	—411,124.34
Other working assets	1,387,350.35	1,540,956.20	—153,605.85
Total working assets	$31,522,138.54	$34,320,356.71	—$2,798,218.17
Accrued income not due:			
Unmatured interest, dividends and rents receivable	$507,640.25	$392,302.46	$115,337.79
Deferred debit items:			
Advances	$1,864,213.75	$1,534,707.44	$329,506.31
Rents and insurance paid in advance	56,479.94	151,382.30	—94,902.36
Special deposits	417,622.86	7,798,005.43	—7,380,382.57
Other deferred debit items	1,213,559.53	1,433,345.22	—219,785.69
Total deferred debit items	$3,551,876.08	$10,917,440.39	—$7,365,564.31
Grand total	$337,223,446.93	$342,853,143.24	—$5,629,696.31

LIABILITIES.	1911.	1910.	Increase or Decrease.
Stock:			
Capital stock	$75,000,000.00	$75,000,000.00	.....
Mortgage, bonded and secured debt:			
Funded debt	230,162,000.00	228,002,000.00	$2,160,000.00
Total capital liabilities	$305,162,000.00	$303,002,000.00	$2,160,000.00
Working liabilities:			
Traffic and car-service balances due to other companies	$940,932.30	$795,878.70	$145,053.60
Audited vouchers and wages unpaid	5,042,603.29	5,254,493.94	—211,890.65
Miscellaneous accounts payable	239,813.50	323,070.38	—83,256.88
Matured interest, dividends and rents unpaid	1,980,352.26	2,683,910.84	—703,558.58
Matured mortgage, bonded and secured debt unpaid	23,000.00	23,000.00	.....
Working advances due to other companies	213,101.29	189,799.69	23,301.60
Other working liabilities	818,638.44	735,643.55	82,994.89
Total working liabilities	$9,258,441.08	$10,005,797.10	—$747,356.02
Accrued liabilities not due:			
Unmatured interest, dividends and rents payable	$1,872,923.87	$1,808,001.10	$64,922.77
Taxes accrued	1,371,588.74	1,354,229.48	17,359.26
Total accrued liabilities not due	$3,244,512.61	$3,162,230.58	$82,282.03
Deferred credit items:			
Operating reserves	$952,868.86	$1,193,907.38	—$241,038.52
Other deferred credit items	1,532,953.93	8,132,024.86	—6,599,070.93
Total deferred credit items	$2,485,822.79	$9,325,932.24	—$6,840,109.45
Grand total liabilities	$320,150,776.48	$325,495,959.92	—$5,345,183.44
Appropriated surplus:			
Additions to property since June 30, 1907, through income	64,367.76	64,367.76	.....
Profit and loss:			
Balance	$17,008,302.69	$17,292,815.56	—284,512.87
Grand total	$337,223,446.93	$342,853,143.24	—$5,629,696.31

NOTE.—In stating the assets and liabilities of the companies forming the Rock Island Lines, the holdings of The Chicago, Rock Island and Pacific Railway Company in the bonds and capital stock of the auxiliary lines, together with loans between the various companies, have been eliminated from the liabilities and a like reduction made in the assets pertaining thereto; the figures shown, therefore, represent the book value of the assets and the liabilities without duplication.

ROAD AND EQUIPMENT—INVESTMENT SINCE JUNE 30, 1907.

CHANGES DURING YEAR ENDED JUNE 30, 1911.

Balance, June 30, 1910, as per balance sheet		$25,704,459.09
CHANGES DURING THE YEAR:		
Additions:		
Additions and betterments, current year (not including equipment), see page 19		$3,425,524.53
Disbursements for additional and improved equipment:		
1 Business car converted from dining car	$125.92	
1 Barge with necessary appurtenances to be used for repairing inclines at Memphis, Tenn.	5,239.91	
2 Locomotive cranes	13,034.40	
1 Locomotive steel pile driver	12,456.40	
1 Locomotive pile driver	12,558.03	
1 Sand blast car including 50 H. P. engine compressor and all necessary fittings	5,407.05	
1 Weed burner	8,000.00	$56,821.71
New appliances for existing equipment, required by federal and state laws	$40,772.01	
Other new appliances for existing equipment	19,863.40	
Silverware for dining and cafe cars	3,900.00	64,535.41
		$121,357.12
Less:		
Sale of axle lighting equipment on Pullman cars to Pullman Company	$35,353.78	
Various adjustments	408.22	35,762.00 85,595.12
Total additions and betterments, as per page 19		$3,511,119.65
United States Express Company of New York, equipment purchase under indenture of January 1, 1911		101,498.28
Bankers Trust Company, equipment purchase under indenture of May 2, 1910		38,210.76
Ballasting line, Tucumcari, N. M., to Santa Rosa, N. M.		30,923.44
Adjustment of charges, Yarnall, Texas-Amarillo, Texas, line		22,581.93
		$3,704,334.06
Deductions:		
Central Trust Company of New York, equipment purchase under indenture of April 1, 1909.—Credit from material furnished equipment builders		$204,830.42
Reserve for replacement of destroyed equipment which, under mortgages and equipment trust agreements, must be replaced	111,823.28	
Value of equipment destroyed, dismantled or sold during the past fiscal year (exclusive of equipment which, under mortgages or equipment trust agreements, must be replaced). Such value, less salvage, was charged to operating expenses and profit and loss	915,714.88	
Adjustment of charges Rock Island, Arkansas and Louisiana Railroad Company, Alexandria, La., to Eunice, La.	15,527.69	1,247,896.27
Net increase		2,456,437.79
Balance, June 30, 1911, as per balance sheet		$28,160,896.88

EXPENDITURES FOR ADDITIONS AND BETTERMENTS.

YEAR ENDED JUNE 30, 1911.

Right of way and station grounds	$240,296.04	
Real estate	*986.04*	
Widening cuts and fills	195,102.18	
Protection of banks	25,217.99	
Grade revisions and changes of line	26,431.89	
Bridges, trestles and culverts	259,178.16	
Increased weight of rail	130,651.75	
Improved frogs and switches	14,771.59	
Track fastenings and other material	299,571.92	
Ballast	604,459.86	
Additional main tracks	*21,655.44*	
Sidings and spur tracks	232,053.05	
Terminal yards	357,136.42	
Fencing right of way	6,696.44	
Improvement of over and under grade crossings	36,168.78	
Track elevation, elimination of grade crossings, etc.	126,200.76	
Interlocking apparatus	8,038.47	
Block and other signal apparatus	218,499.69	
Telegraph and telephone lines	11,067.40	
Station buildings and fixtures	198,388.10	
Roadway machinery and tools	4,462.06	
Shops, engine houses and turn tables	154,586.16	
Shop machinery and tools	32,348.65	
Water and fuel stations	143,343.59	
Grain elevators and storage warehouses	83,091.29	
Dock and wharf property	1,675.16	
Electric light and power plants	7,429.65	
Electric-power transmission	2,844.19	
Miscellaneous structures	*204.77*	
Interest and commissions	28,250.00	$3,425,524.53
**Equipment*:		
Steam Locomotives	$28,843.43	
Passenger train cars	*20,316.23*	
Freight train cars	15,199.63	
Work equipment	56,628.38	
Floating equipment	5,239.91	85,595.12
Total additions and betterments		**$3,511,119.65**

*Also described on page 18.
Figures in *italics* denote credits.

MAINTENANCE OF WAY AND STRUCTURES—REMARKS.

YEAR ENDED JUNE 30, 1911.

COMPARATIVE STATEMENTS OF RAIL AND BALLAST IN MAIN AND BRANCH LINES OWNED OR LEASED AS OF JUNE 30, 1910 AND 1911.

	RAIL.	TOTAL MILES OWNED OR LEASED.	WEIGHT PER YARD AND MILES OF EACH WEIGHT. 100	85	80	Re-rolled 80	70	65-6-7-8	60	56-8	52 and under
	MAIN LINES.										
1911	First track	*4,418.71	61.85	1,124.58	1,961.23	225.28	49.51	652.26	334.97	9.03	.....
	Second track	267.34	32.02	149.04	82.35	.....	3.93	.....	.....	.....	.....
	Third track	8.01	.....	.....	0.39	.....	7.62	.....	.....	.....	.....
	Total	4,694.06	93.87	1,273.62	2,043.97	225.28	61.06	652.26	334.97	9.03	.....
	Per cent. of main lines	.....	2.00	27.13	43.54	4.80	1.30	13.90	7.14	.19	.....
1910	First track	*4,418.46	5.20	1,089.46	2,022.17	208.50	69.16	665.48	349.26	9.23	.....
	Second track	267.31	.....	148.85	118.46	.....	.....	.....	.....	.....	.....
	Third track	9.43	.....	.....	.....	.....	9.43	.....	.....	.....	.....
	Total	4,695.20	5.20	1,238.31	2,140.63	208.50	78.59	665.48	349.26	9.23	.....
	Per cent. of main lines	.....	.11	26.38	45.59	4.44	1.67	14.17	7.44	.20	.....
	BRANCH LINES.										
1911	First track	2,987.65	.....	24.41	265.25	12.48	349.87	304.32	1,182.91	583.80	264.61
	Second track	14.90	.....	5.02	1.83	.....	.16	.....	7.89	.....	.....
	Total	3,002.55	.....	29.43	267.08	12.48	350.03	304.32	1,190.80	583.80	264.61
	Per cent. of branch lines	.....	.....	.98	8.90	.42	11.66	10.14	39.66	19.44	8.81
1910	First track	2,985.49	.....	24.86	263.98	.....	353.54	303.55	1,173.02	591.25	275.29
	Second track	14.90	.....	5.02	1.99	.....	.....	.....	7.89	.....	.....
	Total	3,000.39	.....	29.88	265.97	.....	353.54	303.55	1,180.91	591.25	275.29
	Per cent. of branch lines	.....	.....	1.00	8.86	.....	11.78	10.12	39.36	19.71	9.17
1911	Total track	7,696.61	93.87	1,303.05	2,311.05	237.76	411.09	956.58	1,525.77	592.83	264.61
	Per cent. of total track	.....	1.22	16.93	30.03	3.09	5.34	12.43	19.82	7.70	3.44
1910	Total track	7,695.59	5.20	1,268.19	2,406.60	208.50	432.13	969.03	1,530.17	600.48	275.29
	Per cent. of total track	.....	.07	16.48	31.27	2.71	5.62	12.59	19.88	7.80	3.58

MAINTENANCE OF WAY AND STRUCTURES—REMARKS.

YEAR ENDED JUNE 30 ,1911.

COMPARATIVE STATEMENTS OF RAIL AND BALLAST IN MAIN AND BRANCH LINES OWNED OR LEASED AS OF JUNE 30, 1910 AND 1911.—(Continued.)

	Ballast.	Total Miles Owned or Leased.	Kind of Ballast and Miles of Each Kind. Rock.	Burned Clay.	Gravel.	Cinder.	Total.	Sand or Dirt.
	Main Lines.							
1911	First track	*4,418.71	1,290.77	523.52	1,360.59	364.36	3,539.24	879.47
	Second track	267.34	24.86	.....	209.91	29.57	264.34	3.00
	Third track	8.01	.....	.....	.39	7.62	8.01	.....
	Total	4,694.06	1,315.63	523.52	1,570.89	401.55	3,811.59	882.47
	Per cent. of main lines	.....	28.03	11.15	33.47	8.55	81.20	18.80
1910	First track	*4,418.46	1,211.27	491.71	1,357.81	411.25	3,472.04	946.42
	Second track	267.31	16.10	.....	222.90	25.40	264.40	2.91
	Third track	9.43	.....	.....	9.43	.....	9.43	.....
	Total	4,695.20	1,227.37	491.71	1,590.14	436.65	3,745.87	949.33
	Per cent. of main lines	.....	26.14	10.47	33.87	9.30	79.78	20.22
	Branch Lines.							
1911	First track	2,987.65	115.15	35.16	656.18	263.49	1,069.98	1,917.67
	Second track	14.90	.....	.....	.50	14.40	14.90	.....
	Total	3,002.55	115.15	35.16	656.68	277.89	1.084.88	1,917.67
	Per cent. of branch lines	.....	3.84	1.17	21.87	9.26	36.14	63.86
1910	First track	2,985.49	118.95	30.83	625.11	271.31	1,046.20	1,939.29
	Second track	14.90	.....	.....	.....	14.90	14.90	.....
	Total	3,000.39	118.95	30.83	625.11	286.21	1,061.10	1,939.29
	Per cent. of branch lines	.....	3.96	1.03	20.38	9.54	35.36	64.64
1911	Total track	7,696.61	1,430.78	558.68	2,227.57	679.44	4,896.47	2,800.14
	Per cent. of total track	.....	18.59	7.26	28.94	8.83	63.62	36.38
1910	Total track	7,695.59	1,346.32	522.54	2,215.25	722.86	4,806.97	2,888.62
	Per cent. of total track	.....	17.49	6.79	28.79	9.39	62.46	37.54

*See statement on next page, showing the miles which are classified as **"Main lines."**

MAINTENANCE OF WAY AND STRUCTURES—REMARKS —Concluded.

YEAR ENDED JUNE 30, 1911.

The following is a comparative statement of miles of the first track main lines (as distinguished from branch lines) owned or leased, not including trackage rights, which are used in the rail and ballast tables on preceding page:

	June 30, 1911.	1910.
Chicago, Ill., to Colorado Springs, Colo	1,063.09	1,063.03
Davenport, Ia., to Dallas, Tex. (via Kansas City)	833.61	833.61
Herington, Kan., to Santa Rosa, N. M.	526.92	526.92
Burlington, Ia., to Minneapolis, Minn.	307.58	307.58
Altamont, Mo., to North Topeka, Kan. (via St. Joseph)	137.91	137.96
McFarland, Kan., to Belleville, Kan.	103.19	103.19
Memphis, Tenn., to Tucumcari, N. M.	869.87	869.87
Biddle, Ark., to Eunice, La.	292.64	292.40
St. Louis, Mo., to Kansas City, Mo.	283.90	283.90
	4,418.71	4,418.46

Improvements to roadway have been made as follows:

Ties were renewed to the extent of 2,378,361 or an average of 311 per mile of first, second and third main track owned and leased: of these ties; 1,924,783 were treated with creosote.

Track miles of new ballast	184.30 miles
Track miles reballasted	281.71 miles
Miles of roadbed widened to standard width	299.43 miles
Road miles of new right of way fence built	56.84 miles
Linear feet, transversely to track, of concrete arch culverts built	4,967 feet
Linear feet, transversely to track, of iron pipe culverts built	6,223 feet
Linear feet, transversely to track, of vitrified pipe culverts built	212 feet
Linear feet of timber bridges or trestles replaced with steel, concrete or masonry bridges	418 feet
Linear feet of bridges and trestles filled	9,133 feet
Linear feet of iron or steel bridges replaced with heavier structures	3,273 feet
Linear feet of new pile trestles built	1,134 feet
Linear feet of new steel bridges built	480 feet

The following table shows the aggregate length and nature of bridges for June 30, 1911, compared with previous year:

Bridges.	Total (feet).	Kind of Bridge and Length (in feet) of Each Kind. Steel and iron.	Combination (wood and) Masonry.	(wood and) iron).	Wooden.	Trestles.
Main track, June 30, 1911.	514,081	149,821	891	1,488	2,385	359,496
Per cent. of total length	.....	29.14	.17	.29	.46	69.93
Main track, June 30, 1910.	521,879	147,616	620	3,093	2,449	368,101
Per cent. of total length	.....	28.29	.12	.59	.47	70.53

The average expense of maintenance of way and structures per mile of first, second and third main track owned and leased during the past fiscal year was $1,246.11, as against $1,372.85 last year.

All the rail relaid during the year has replaced lighter weight, and a corresponding increase in metal has been made in appliances.

FREIGHT TRAFFIC STATISTICS.

YEAR ENDED JUNE 30, 1911, COMPARED WITH PREVIOUS YEAR.

	1910-11.	1909-10.	Increase or Decrease.
Revenue per ton mile	$ .0092	$ .0092	....
Revenue per ton	$ 2.268	$ 2.203	$ .065
Revenue per train mile	$ 2.479	$ 2.380	$ .099
Revenue per car mile (excludes caboose car miles)	$ .0965	$ .0992	—$ .0027
Revenue per mile of road	$5,403.43	$5,248.76	$154.67
Number of tons per train mile—revenue freight	269.66	257.43	12.23
Number of tons per train mile—company freight	50.26	39.51	10.75
Number of tons per train mile—all freight	319.92	296.94	22.98
Number of tons per loaded car mile—revenue freight	14.92	15.07	— .15
Number of tons per loaded car mile—company freight	2.78	2.31	.47
Number of tons per loaded car mile—all freight	17.70	17.38	.32
Number of cars per train—loaded	18.05	17.06	.99
Number of cars per train—empty	7.61	6.89	.72
Number of cars per train—all	25.66	23.95	1.71
Average haul per ton—revenue freight (in miles)	246.80	238.28	8.52
Average haul per ton—company freight (in miles)	139.05	117.37	21.68
Average haul per ton—all freight (in miles)	220.02	209.55	10.47
Average ton miles of revenue freight per mile operated	287,890	567,792	20,098

PASSENGER TRAFFIC AND PER MILE OF ROAD STATISTICS.

YEAR ENDED JUNE 30, 1911, COMPARED WITH PREVIOUS YEAR.

Passenger Traffic:	1910-11.	1909-10.	Increase or Decrease.
Revenue per passenger mile	$ .0200	$ .0191	$ .0009
Revenue per passenger	$ 1.020	$ .962	$ .058
Revenue per train mile (excluding mail, express, etc.)	$ 1.100	$ 1.035	$ .065
Revenue per train mile (including mail, express, etc.)	$ 1.312	$ 1.226	$ .086
Revenue per car mile (cars carrying passengers)	$ .292	$ .276	$ .016
Revenue per mile of road (excluding mail, express, etc.)	$2,521.84	$2,409.14	$112.70
Revenue per mile of road (including mail, express, etc.)	$3,009.37	$2,869.56	$139.81
Number of passengers per train mile	54.91	54.31	.60
Number of passengers per car mile (cars carrying passengers)	14.55	14.46	.90
Average distance carried (in miles)	50.90	50.47	.43
Number of cars per train	5.32	5.10	.22
Average miles of revenue passengers per mile operated	125,844	126,360	— 516
Per Mile of Road:			
Total operating revenue	$8.533.11	$8,232.71	$300.40
Operating expenses	6,112.03	5,976.11	135.92
Net operating revenue	$2,421.08	$2,256.60	$164.48
Taxes	337.48	357.64	—$ 20.16
Operating income	$2,083.60	$1,898.96	$184.64
Outside operations (debit balance)	*14.42*	*19.38*	—$ *4.96*
Hire of equipment (debit balance)	*158.70*	*145.59*	*13.11*
Other income	196.23	192.72	3.51
Total income	$2,106.71	$1,926.71	$180.00
Interest	$1,213.77	$1,135.05	$ 78.72
Rentals	212.42	192.38	20.04
Betterments on lines leased from other companies*	2.38	9.01	—$ 6.63
Total charges	$1,428.57	$1,336.44	$ 92.13
Balance of income (available for dividends)	$ 678.14	$ 590.27	$ 87.87
Betterments on lines leased from other companies, per mile of the leased roads so improved†	$ 103.78	$ 393.88	—$290.10

*Used average miles operated same as for other computations.

†Covers Keokuk and Des Moines Railway and Little Rock and Hot Springs Western Railroad.

BALTIMORE AND OHIO RAILROAD COMPANY EIGHTY-FIFTH ANNUAL REPORT.

Office of The Baltimore and Ohio Railroad Company.
Baltimore, Md., October 19, 1911.

To the Stockholders of The Baltimore and Ohio Railroad Company.

The President and Directors herewith submit report of the affairs of the Company for the fiscal year ended June 30, 1911.

The statement following shows the results of the operations of the entire System, with the exception of the Staten Island Railway Company, the Staten Island Rapid Transit Railway Company, and the Baltimore and Ohio Chicago Terminal Railroad Company, and covers 4,433.74 miles of road, shown in detail in Table 24.

The Gross Earnings from rail operations were $88,145,003.76, a decrease of $756,248.61, or .85 per cent.

The earnings from freight traffic decreased $1,778,175.67, or 2.56 per cent. The tons of freight carried were 60,547,887, a decrease of 2,249,858 tons, or 3.58 per cent., and the total tons carried one mile were 11,703,539,445, a decrease of 321,044,082, or 2.67 per cent., as compared with the previous year. The average freight earnings per ton per mile were .578 cents, an increase of .001 cents.

Table 14, gives a comparative statement of commodities carried during the year. The main losses in tonnage, it will be noted, were in coke, ores, stone, lumber and iron products, such losses indicating the effect upon this Company's revenues of the diminished activity which was general with industrial interests throughout the greater part of the fiscal year.

The earnings from passenger traffic were $15,208,432.15, an increase of $722,847.06, or 4.99 per cent. The number of passengers carried was 21,969,166, an increase of 862,046, or 4.08 per cent. The average distance each passenger was carried was 36.23 miles, an increase of .06 miles. The average earnings per passenger per mile were 1.911 cents, an increase of .014 cents.

The earnings from express traffic were $1,780,346.92, an increase of $65,189.95, and from the transportation of mails $1,169,068.20, a decrease of $7,775.55.

The Operating Expenses for the year were $62,766,067.04, an increase of $1,432,266.25, or 2.34 per cent.

There will be found in Table 8 of this report, a comparison in detail of the items entering into the operating accounts. The increase in transportation expenses was principally occasioned by the increase in wages paid, which was largely due to advances made in rates of pay, effective the latter part of the fiscal year ended June 30, 1910. The interruptions to traffic incident to the extensive betterment work carried on at numerous points also affected adversely the transportation costs, and recent legislation, State and Federal, (notably the so-called "Full Crew" bills) has had similar effect upon the expenses. On account of the previous liberal maintenance expenditures, particularly in the preceding year, and because of the diminished volume of business moving in the last six months of the fiscal year, it was practicable to reduce maintenance expenditures to such an extent as to partly offset the increase in transportation charges above referred to. The total of all maintenance costs for the year was 29.68% of the gross earnings, which is a liberal basis of expenditure and ample for the maintenance of the road and equipment under existing conditions.

The net result from "Outside Operations" shows a deficit for the year of $148,312.14, as against a deficit last year of $599,633.70.

The total Operating Income was $22,634,374.78, a decrease of $1,863,478.93 compared with previous year.

The increase in "Other Income" of $678,700.28 is due principally to the increase in "Interest on Bonds Owned." This increase includes interest on bonds acquired during the previous fiscal year and included in the Balance Sheet of June 30, 1910, but on which no interest was received during that period.

"Deductions from Gross Corporate Income" shows an increase in charges of $2,242,817.15, and is mainly caused by increase in "Interest on Funded Debt," which is principally due to interest charges on $40,000,000.00 of Three Year Secured Notes issued June 1st, 1910, interest on which was accrued for the entire twelve months of the present fiscal year as against one month of the previous year. In this connection it is proper to state that as yet little benefit has been realized from the use of the additional capial, but with the completion of the additions and bettermens, (hereinafter referred to in some detail) the road will not only be in position to care for a largely increased business, but will also be enabled to handle more effectively and economically the present volume of traffic.

The General Income Account of the Company for the year, in comparison with the previous year, follows.

General Income Account of The Baltimore and Ohio Railroad, Year Ended June 30, 1911, in Comparison with the Year Ended June 30, 1910.

	1911.	1910.	Increase or Decrease.
Miles of Road Operated...	4,433.74	4,434.39	—.65
Earnings:			
From Freight Traffic.....	$67,629,937.01	$69,408,112.68	—$1,778,175.67
From Passenger Traffic...	15,208,432.15	14,485,585.09	722,847.06
From Express Traffic.....	1,780,346.92	1,715,156.97	65,189.95
From Transportation of Mails	1,169,068.20	1,176,843.75	—7,775.55
From Miscellaneous Transportation	1,475,275.69	1,327,726.42	147,549.27
From Operations other than Transportation	881,943.79	787,827.46	94,116.33
Gross Earnings	$88,145,003.76	$88,901,252.37	—$756,248.61
Expenses:			
For Maintenance of Way and Structures	$10,279,615.82	$11,661,409.75	—$1,381,793.93
For Maintenance of Equipment	15,881,620.38	16,373,775.93	—492,155.55
For Traffic Expenses.....	1,948,966.46	1,877,203.56	71,762.90
For Transportation Expenses	32,818,499.86	29,738,992.09	3,079,507.77
For General Expenses....	1,837,364.52	1,682,419.46	154,945.06
Total Expenses	$62,766,067.04	$61,333,800.79	$1,432,266.25
Percentage of Expenses to Earnings	71.21	68.99	2.22
Net Earnings from Operation	**$25,378,936.72**	**$27,567,451.58**	**—$2,188,514.86**
Outside Operations:			
Total Revenue	$1,823,126.74	$1,262,148.72	$560,978.02
Total Expenses	1,971,438.88	1,861,782.42	109,656.46
Net Revenue	Def.$148,312.14	Def.$599,633.70	$451,321.56
Total Net Revenue.....	$25,230,624.58	$26,967,817.88	—$1,737,193.30
Taxes Accrued	2,596,249.80	2,469,964.17	126,285.63
Operating Income	$22,634,374.78	$24,497,853.71	—$1,863,478.93
Other Income:			
Rents—			
Joint Facilities — Total Receipts	$517,455.19	$495,521.00	$21,934.19
Miscellaneous Rents — Total Receipts	478,540.14	466,973.88	11,566.26
Dividends on Stocks Owned	1,630,735.14	1,541,777.41	88,957.73
Interest on Bonds Owned	758,842.75	202,968.26	555,874.49
Other Interest	1,398,815.28	1,381,863.42	16,951.86
Western Union Telegraph Company Annuity....	60,000.00	60,000.00	.....
Miscellaneous Income..	52,209.79	68,794.04	—16,584.25
Total Other Income..	$4,896.598.29	$4,217,898.01	$678,700.28
Gross Corporate Income	$27,530,973.07	$28,715,751.72	—$1,184,778.65
Deductions from Gross Corporate Income:			
Rents—			
Hire of Equipment—Net Balance	$772,566.72	$437,653.06	$334,913.66
Joint Facilities — Total Payments	835,461.12	853,377.04	—17,915.92
Miscellaneous Rents — Total Payments.....	191,052.89	170,298.43	20,754.46
Interest on Funded Debt	12,558,458.80	10,763,826.06	1,794,632.74
Other Interest	350,575.53	234,043.77	116,531.76
Other Deductions account Subsidiary Lines	2,866.78	8,966.33	—6,099.55
Total Deductions from Income	$14,710,981.84	$12,468,164.69	$2,242,817.15
Net Corporate Income	$12,819,991.23	$16,247,587.03	—$3,427,595.80
Additions to Property through Income	.....	415,760.61	—415,760.61
Balance Net Corporate Income	$12,819,991.23	$15,831,826.42	—$3,011,835.19
Balance Net Corporate Income.....			$12,819,991.23
Dividend Payments:			
Preferred—			
March 1, 1911, 2%.....$1,177,805.04			
September 1, 1911, 2%..... 1,177,740.16		$2,355,545.20	
Common—			
March 1, 1911, 3%.....$4,560,061.60			
September 1, 1911, 3%..... 4,560,538.00		9,120,599.60	11,476,144.80
			$1,343,846.43
Amount to Credit of Profit and Loss, June 30, 1910	$23,377,100.33		
Add Sundry Adjustments, including $10,965,-168.91 transferred from "Additions to Property prior to June 30, 1907, through Income," making Net Credit Balance.....	13,731,472.53		37,108,572.86
Amount to Credit of Profit and Loss June 30, 1911.....			$38,452,419.29

The General Balance Sheet will be found in Table 1.

The Property Investment account of "Road and Equipment" shows a net increase for the year of..... $27,291,803.16

made up as follows:

Expenditures for Road	$14,092,875.15
Expenditures for Equipment.....	14,568,327.31
Sundry book adjustments	879,578.81
	$29,540,781.27
Less:—Increase in Reserve for Accrued Depreciation.....	2,248,978.11
	$27,291,803.16

Note.—The decrease of $3,801,146.98 in "Investment to June 30, 1907—Road" represents a credit to this grouping and a charge to "Investment since June 30, 1907—Road," in book adjustments and does not affect the total of the grouping of "Road and Equipment."

The decrease in "Securities" during the year, $219,726.16, is due to the redemption by the Kentucky and Indiana Bridge and Railroad Co. of its First Mortgage Bonds, $379,674.54 of which were held by your Company, which decrease was partly offset by the acquisition of stocks of subsidiary companies.

The increase of $1,006,935.78 in "Other Investments," is due to the transfer to this account of Richmond-Washington Company stock, $445,000.00; "Rail Loan Accounts," $443,805.16, and other similar adjustments made during the year to conform to the Interstate Commerce Commission's form of accounts.

The decrease in "Working Assets" of $25,317,203.18, was caused principally by the reduction in "Cash" and "Loans and Bills Receivable," on account of the large expenditures for construction, improvements and equipment during the year.

The increase in "Preferred Stock" of $3,012.50, and in "Common Stock" of $88,144.40, was occasioned by the exchange of securities and the conversion by the holders of $88,000.00 of Convertible Debenture Bonds into Common Stock.

The "Mortgage, Bonded, and Secured Debt" increased....			$10,825,938.60
occasioned as follows:			
Issuance of First Mortgage Bonds in recoupment of expenditures for construction on properties under this mortgage			$1,000,000.00
Issuance of Pittsburgh, Lake Erie & West Virginia System Refunding Mortgage Bonds in exchange for underlying securities			1,000.00
Issuance of Three Year Gold Notes due 1913, to retire a like amount of One Year Notes matured March 10, 1911....			10,000,000.00
			$11,001,000.00
Less:			
Ten Year Convertible Debenture Bonds converted into Common Stock		$88,000.00	
West Virginia & Pittsburgh R. R., First Mortgage Bonds, deposited with trustees		18,000.00	
B. & O. R. R. Co., Extended Bonds retired....		34,000.00	
Net decrease in Ground Rent Liens, capitalized.		14,561.40	
And the following items transferred to the grouping "Matured Mortgage, Bonded and Secured Debt Unpaid"—			
B. & O. R. R. Co., Loan of 1853...	$500.00		
" Loan of 1885...	1,000.00		
" Loan of 1887...	9,000.00		
Ten Year Convertible Debentures	10,000.00	20,500.00	175,061.40
			$10,825,938.60

The decrease in "Loans and Bills Payable" is due mainly to the retirement of $10,000,000.00 of One Year Gold Notes due March 10, 1911, in place of which an equal amount of Three Year Gold Secured Notes were issued as shown above.

The decrease of $10,965,168.91 in "Appropriated Surplus—Additions to Property through Income prior to June 30, 1907," is occasioned by the transfer to "Profit and Loss—Balance" of this amount. The Classification of the Interstate Commerce Commission not providing for the account mentioned, the transfer was made for the purpose of bringing the Balance Sheet into full conformity with the Commission's requirements.

ADDITIONS TO ROAD AND EQUIPMENT.

In pursuance of the purpose of your Board, referred to in the last Annual Report, in the issuance of $50,000,000.00 Three-Year Gold Secured Notes, due June 1, 1913, to provide necessary facilities to meet the demands of general business and particularly the increasing industrial development upon your lines of railway, large additions were made during the year to your locomotive and car equipment, and the extensive addition and betterment work undertaken at various points was vigorously prosecuted.

Table 23 shows in detail the equipment acquired during the year, which includes 187 locomotives, 8,268 freight cars, 26 passenger cars and other equipment at a cost of $15,439,203.30.

Satisfactory progress has been made with the extensive betterment work referred to in the last report, and also in connection with the additional undertakings, estimated to cost about $13,000,000, which were authorized during the year.

Table 5 shows the expenditures made during the year, classified under the principal subdivisions of Addition and Betterment accounts, aggregating $14,092,875.15.

ROAD.

Some of the more important improvements completed during the year were:

Change of line and grade reduction, Concord to Wilmington, Philadelphia Division.

Third Track on Cumberland Division between Cherry Run and Orleans Road, Swanton and Strickers, Deer Park and Mountain Lake Park, Terra Alta and Rodemer, and between West End and Hardman, a total of 44.3 miles additional and standardized third track. In connection with this work, the Tunnels at Everetts, McGuires, Rodemer and Murray were converted into open cuts. The change of grade and alignment between Hutton and Corinth, a distance of 2.4 miles was also completed.

A third track was completed between Foley and Manila, on the Connellsville Division, a distane of 7 miles.

The Quemahoning Branch Railroad was extended 9 miles to a connection with the Somerset & Cambria Branch at Somerset.

Second track, Wellsboro to McCool, on the Chicago Division, a distance of 21 miles, including interlocking plant at Babcock, was practically completed at the close of the year and has since been put in operation.

Interlocking plants were completed and put in service at Schuylkill River Drawbridge; at East End Susquehanna River Bridge; at End of Third Track, Hobbs; N. & W. Crossing, at Charlestown; Bridge 401 at Cleveland; Muskingum River Drawbridge at Marietta; and Wabash River Drawbridge at Vincennes.

Automatic signals have been installed between Goehring and New Castle Junction; Pittsburgh and Connellsville; Loveland and Cincinnati; and Washington Junction and Brunswick, providing automatic block protection for 104.9 additional miles of main double track.

At Grafton, W. Va., the additional terminal facilities referred to in the last Annual Report, were practically completed at the close of the fiscal year and, together with the new Passenger Station, have since been put in service.

Three improved ore handling machines were put in service at Lorain. The ore and coal docks at this point, over which is handled the coal from West Virginia and south-eastern Ohio coal fields, are among the largest on the Great Lakes. The arrangements for weighing ore direct into cars are believed to be the most complete so far installed at any dock.

New or enlarged station facilities were completed at Wilmington, Del.; Lorely, Md.; Harrisonburg and Fort Defiance, Va.; Parkersburg, Huntington, Philippi, Millers and Elm Grove, W. Va.; Oakley and Portsmouth, Ohio; Napanee and Garrett, Ind.; and Noble, Ill.

The large Bascule Drawbridge over the Cuyahoga River, at Cleveland, has also been completed.

The following are some of the larger improvements now under way:

ADDITIONS TO TRACK AND BETTERMENT OF ROAD.

Second track construction on the Chicago Division between Hamler and Holgate, Delaware Bend and Mark Centre, and Lapaz Junction and Wellsboro, a distance of 35.5 miles. Grading is being done for second track between Holgate and Midway and between Cromwell and Milford Junction, a total distance of 22 miles.

Third track construction from Weverton to Sandy Hook, Green Spring to Patterson Creek, Manila to N. A. Tower and Garrett to Rockwood is now under way.

Passing sidings at various points on the line between Parkersburg and East St. Louis are now being constructed.

The change of line and reduction of grade between Blaser and the west end of Kingwood Tunnel, a distance of about 4 miles, including construction of double track tunnel 4,250 feet in length, has progressed steadily during the year, and is approximately one-half done. The present line through Kingwood Tunnel, which is single track, operated in conjunction with this new line, will provide three tracks, and afford necessary relief where the movement of traffic has hitherto been much restricted.

The construction of 1.8 miles of new line, including a double track tunnel 4,000 feet long through the Allegheny Mountains between Sand Patch and Manila, is under way. Upon the completion of this work, which it is expected will be about January, 1913, a very serious restriction to the movement of traffic over this division will have been removed.

ADDITIONS AND BETTERMENTS OF YARDS AND TERMINAL FACILITIES.

Brunswick, Md. A new west-bound freight classification yard to expedite the handling of trains is being constructed.

Cumbo, W. Va. Additional interchange facilities with the Cumberland Valley Railroad are being constructed at this point.

Somerset, Pa. Additional terminal yards and facilities at this place are under construction. These improvements are necessary in connection with the new Quemahoning Branch Railroad Extension, above referred to, and to care for the general increase in traffic in this region.

Chicago Junction, Ohio. The new east and west-bound yards have been put in operation.

THE RENEWAL OF BRIDGES AND ELIMINATION OF GRADE CROSSINGS.

Considerable progress has been made in renewing bridges for the use of heavier power. Among the more important bridges renewed were the Schuylkill River Drawbridge at Philadelphia; Brandywine Viaduct at Wilmington; and Cheat River at Rowlesburg.

The elimination of grade crossings in the cities of Baltimore, Columbus and Chicago, has progressed steadily during the year. The work at Columbus will be completed early in the current year; that at Baltimore and Chicago will extend over a period of years.

EQUIPMENT.

Total Book Value of Equipment, June 30, 1910, was.....		$72,946,825.18
During the year there was added to the equipment the following: 187 Locomotives, 26 Passenger Cars, 8,268 Freight Cars, 5 Work Cars, 2 Steel Car Floats, 2 Wooden Car Floats, 1 Refrigerator Lighter, at a value of.....		15,439,203.30
Total		$88,386,028.48
During the year the following equipment was put out of service through condemnation, wreck, fire and sale: 37 Locomotives, 10 Passenger Cars, 3,202 Frieght Cars, 335 Work Cars, 1 Wharf Boat and 1 Scow, the book value of which, viz. ..... was credited to "Property Investment, Equipment" and charge made to "Reserve for Accrued Depreciation" as noted below, and the balance to Operating Expenses;		870,875.99
Making the Gross Book Value of Equipment.....		$87,515,152.49
From this should be deducted:		
"Reserve for Accrued Depreciation," as follows—		
Amount at Credit June 30, 1910.....	$6,048,981.51	
Amount charged Operating Expenses during year ended June 30, 1911, covering depreciation	2,317,848.60	
	$8,366,830.11	
Less charges, account of depreciation accrued on Equipment put out of service during the year	68,870.49	
Total "Reserve for Accrued Depreciation".....		8,297,959.62
Leaving Net Value of Equipment, June 30, 1911.....		$79,217,192.87

The title to 177 of the locomotives and 8,000 of the freight cars, acquired during the year, was taken in the name of the Baltimore and Ohio Equipment Company, all the securities of which are owned by your Company, making a total of 340 locomotives and 15,000 freight cars now held by that Company.

INDUSTRIAL DEPARTMENT.

Two hundred and twenty-four new industries, manufacturing and commercial, were located on or immediately adjacent to your line during the year, from which it is estimated the Company should ultimately derive freight revenue of over $1,000,000.00 per annum. Side tracks have been constructed to 135 of these plants.

The latest results in scientific agriculture have been presented to farmers on special educational trains by demonstrators and lecturers from the experiment stations of the various States served by System lines.

INSURANCE FUND.

A summary of the operations for the year ended June 30, 1911, and a statement of the assets and liabilities are shown in Table 6. The surplus in this Reserve Fund at June 30, 1911, was $1,172,099.85.

RELIEF DEPARTMENT.

The report of the Relief Department for the twelve months ended June 30, 1911, will be printed, as customary, for distribution to members. The operations of the department, covering the Relief, Savings and Pension features, will be found in Table 7 of this report.

The Board record with deep regret the death, on June 28, 1911, of Mr. Joseph R. Foard, a Director of the Company since October 11, 1906, and express their high appreciation of the attentive and effective consideration which he gave to the interests of the Company.

The President and Directors acknowledge with pleasure the loyal and efficient services of the officers and employees during the past year.

By order of the Board,

DANIEL WILLARD,
President.

Table 1.

GENERAL BALANCE SHEET.

The Baltimore and Ohio Railroad System.

ASSETS.			Comparison with June 30, 1910. Increase or Decrease.
Property Investment:			
Road and Equipment—			
Investment to June 30, 1907—			
Road	$199,390,939.31		—$3,801,146.98
Equipment	62,942,416.61		
		$262,333,355.92	
Investment since June 30, 1907—			
Road	$29,805,300.71		18,771,942.35
Equipment	24,572,735.88		14,568,327.31
General Expenditures.	31,405.53		1,658.59
		54,409,442.12	
		$316,742,798.04	$29,540,781.27
Reserve for Accrued Depreciation—			
Cr. (Equipment)		8,297,959.62	Cr. 2,248,978.11
Total		$308,444,838.42	$27,291,803.16
Securities—			
Securities of Proprietary, Affiliated and Controlled Companies—Pledged—			
Stocks	$43,219,166.30		$96,296.10
Funded Debt	126,741,878.87		1,000.00
Miscellaneous	5,905,583.01		
		$175,866,628.18	
Securities of Proprietary, Affiliated and Controlled Companies—Unpledged—			
Stocks	$8,047,004.75		62,652.28
Funded Debt	950,349.67		—379,674.54
Total		8,997,354.42	
		$184,863,982.60	—$219,726.16
Other Investments—			
Miscellaneous Investments—			
Physical Property	$4,257,036.06		$466,390.72
Securities Pledged	46,673,284.00		
Securities Unpledged.	4,018,017.50		540,545.06
Total		$54,948,337.56	$1,006,935.78
Total Property and Other Investments		$548,257,158.58	$28,079,012.78
Working Assets:			
Cash		$7,539,414.95	—$4,216,536.39
Securities Issued or Assumed Held in Treasury—(Par Value)			
Stocks	$1,399,887.29		173,541.20
Funded Debt	7,066,370.00		873,430.23
		8,466,257.29	
Marketable Securities—			
Stocks	$188,217.53		—707,903.96
Funded Debt	838,289.14		—29,179.50
		1,026,506.67	
Loans and Bills Receivable		18,750,933.65	—20,878,959.24
Traffic and Car-Service Balances Due from Other Companies		249,770.74	—153,180.57
Net Balance Due from Agents and Conductors		2,456,822.08	—119,074.44
Miscellaneous Accounts Receivable		8,827,551.06	—44,231.00
Materials and Supplies		7,311,150.30	—215,109.51
Total		$54,628,406.74	—$25,317,203.18
Deferred Debit Items:			
Advances—			
Temporary Advances to Proprietary, Affiliated, and Controlled Companies	$260,000.00		$260,000.00
Working Funds	178,262.11		8,796.81
Other Advances	89,581.65		29,581.65
		$527,843.76	
Special Deposits		17,000.00	17,000.00
Cash and Securities in Sinking and Redemption Funds		244,991.02	—41,009.30
Cash and Securities in Insurance and Other Reserve Funds		1,172,099.85	96,627.26
Cash and Securities in Provident Funds.		99,175.20	8.00
Other Deferred Debit Items		456,760.38	77,485.67
Total		$2,517,870.21	$448,490.09
Grand Total		$605,403,435.53	$3,210,299.69

LIABILITIES.			Comparison with June 30, 1910. Increase or Decrease.
Stock:			
Capital Stock—			
Common Stock—			
Held by Company	$286,895.50		$50,494.34
Not Held by Company	151,950,092.26		37,650.06
		$152,236,987.76	
Preferred Stock—			
Held by Company	$1,112,991.79		4,296.49
Not Held by Company	58,873,974.71		—1,283.99
		59,986,966.50	
		$212,223,954.26	
Stock Liability for Conversion of Outstanding Securities of Constituent Companies		83,713.74	—3,276.87
Total		$212,307,668.00	$87,880.03
Mortgage, Bonded, and Secured Debt:			
Funded Debt—			
Mortgage Bonds—			
Held by Company	$2,058,900.00		$914,250.00
Not Held by Company	228,945,680.00		24,250.00
		$231,004,580.00	
Collateral Trust Bonds—			
Held by Company	$5,007,470.00		—40,890.00
Not Held by Company	44,992,530.00		40,890.00
		50,000,000.00	
Plain Bonds, Debentures and Notes—			
Held by Company	.....		
Not Held by Company	$50,000,000.00		9,902,000.00
		50,000,000.00	
Miscellaneous Funded Obligations—			
Held by Company	.....		
Not Held by Company	$1,130,495.66		
		1,130,495.66	—14,561.40
Total		$332,135,075.66	$10,825,938.60
Total Capital Liabilities		$544,442,743.66	$10,913,818.63
Working Liabilities:			
Loans and Bills Payable		$300,333.33	—$9,699,666.67
Traffic and Car-Service Balances Due to Other Companies		341,731.76	—24,037.32
Audited Vouchers and Wages Unpaid		5,520,920.50	—691,423.12
Miscellaneous Accounts Payable		669,402.71	—243,580.72
Matured Interest, Dividends, and Rents Unpaid		2,540,181.98	$2,359,744.62
Matured Mortgage, Bonded, and Secured Debt Unpaid		20,500.00	20,500.00
Working Advances Due to Other Companies		273,222.01	—2,164,414.99
Other Working Liabilities		107,976.33	107,976.33
Total		$9,774,268.62	—$10,334,901.87
Accrued Liabilities Not Due:			
Unmatured Interest, Dividends, and Rents Payable		$7,278,776.52	—$2,495,082.13
Total		$7,278,776.52	—$2,495,082.13
Deferred Credit Items:			
Liability on Account of Provident Funds		$1,821,653.71	$534,640.05
Other Deferred Credit Items		1,233,714.82	443,327.28
Total		$3,055,368.53	$977,967.33
Appropriated Surplus:			
Additions to Property through Income—			
Prior to June 30, 1907		.....	—$10,965,168.91
Since June 30, 1907		$1,227,759.06	—58,279.58
Reserves from Income or Surplus—			
Invested in Other Reserve Funds		1,172,099.85	96,627.26
Total		$2,399,858.91	—$10,926,821.23
Profit and Loss:			
Balance		$38,452,419.29	$15,075,318.96
Grand Total		$605,403,435.53	$3,210,299.69

The following securities outstanding in hands of public bear the endorsement of The Baltimore and Ohio R. R. Co.: Cincinnati, Hamilton & Dayton R'y Co., 1st and Refunding Mortgage Bonds, $7,500,000.00, and Purchase Money Notes, $11,557,000.00. The following securities bear the endorsement of The Baltimore and Ohio R. R. Co., jointly with other companies, viz.: Akron Union Passenger Depot Co., 1st Mortgage Bonds, $81,000.00; Kentucky & Indiana Terminal R. R. Co., 1st Mortgage Bonds, $5,970,350.00; Richmond-Washington Company, 1st Mortgage Bonds, $9,500,000.00; Washington Terminal Company, 1st Mortgage Bonds, $12,000,000.00.

The above General Balance Sheet presents an accurate statement of the Accounts of the Company as of June 30, 1911.

G. W. BOOTH, *Comptroller.*